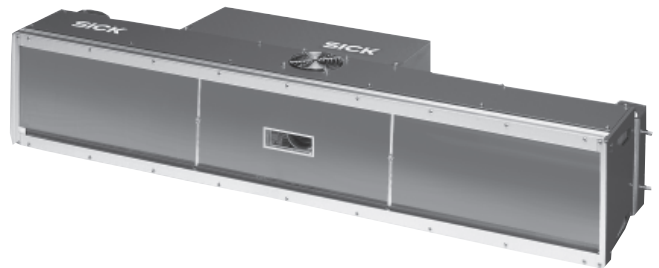


ICR890

High-end CCD Camera System



Camera System for Reading 1-D and 2-D Codes with Superb
Image Quality suitable for OCR and Video Coding Applications



Software Versions

Software/Tool	Function	Version
ICR890 System	SICK Firmware	From version 1.0 0000
ICR890 Device Description	Device-specific software module for SOPAS-ET Configuration Software	From version 1.00
SOPAS-ET	Configuration software	From version 2.10



RF interference in case of use in residential areas.

- ICR890 High-end CCD Camera System is exclusively intended for use in an industrial environment.

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Germany

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Latest manual version

For the latest version of this manual (PDF), see www.sick.com.

ICR890 High-end CCD Camera System

Quick Finder ...

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- **PLEASE NOTE**
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- **Installing the device in the reading station**
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Overview of installation sequence

The following list summarizes the most important installation sequences for the ICR890 System as a stand-alone device in combination with the MSC800 for reading from above:

1. Check delivery for completeness.
2. Insert the ICI890 Illumination into two 180° brackets on the frame and screw tight. The front window of the ICI890 Illumination should face downwards.
3. Remove the yellow and black protective caps from the lens protection tube and from ICD890 Camera lens.
Do not touch the lens!
4. Align the ICD890 Camera from the correct side to the illumination and carefully insert the lens protection tube into the ICI890 Illumination opening.
5. Attach the ICD890 Camera to the ICI890 Illumination. Align the entire unit parallel to the conveyor level and screw on the 180° brackets.
6. Connect the control line and the ICI890 Illumination power supply to the ICD890 Camera.
7. Insert and tighten the deflection mirror incl. the protective film on the opposite side to the ICI890 Illumination in two additional 180° brackets, parallel to the conveyor level.
The deflection mirror must be positioned at the same height as and exactly parallel to the illumination.
8. Install the MSC800 close to the reading location.
9. Install the photoelectric reflex switch on the conveyor system in front of the reading location in opposite direction of transport.
10. Install the MLG Light Grid on the conveyor system in front of the photoelectric reflex switch in opposite direction of transport.
11. Install the incremental encoder on the conveyor system at the reading location.
12. Electrically connect the ICR890 System to the MSC800.
13. Connect the photoelectric reflex switch, MLG Light Grid, incremental encoder as well as data processing host and PC to the MSC800 configuration.
14. Connect the MSC800 to the supply voltage (100 to 264 V AC/50 to 60 Hz).
15. Switch on the MSC800 using the main switch.
The ICR890 System and the MSC800 start up automatically.
16. Switch on the PC and install the SOPAS-ET Configuration Software (minimum requirements: Windows 98™).
17. Start the SOPAS-ET Configuration Software and set up the new SOPAS-ET Project by choosing the appropriate ICR890 and MSC800 Device Descriptions.
18. Establish communication with the MSC800.
19. Configure the ICR890 System via the register tabs in the SOPAS-ET Configuration Software (position of the ICR890 in relation to conveyor system, focus control, code configuration, reading pulse, etc.).
20. Trigger the ICR890 System (start reading pulse). To achieve this, move the object into the range of the photoelectric reflex switch and keep it in this position.
The illumination switches on.
21. Remove the protective film from the deflection mirror and set up the deflection mirror ensuring that the ICI890 Illumination light hits the stationary object (code) at a 15° angle (skew angle on the conveyor level).
22. Carry out a test reading with the 1-D/2-D code. Move the object carrying the code several times across the conveyor level beneath the ICR890 System and display the reading results in the SOPAS-ET Configuration Software.
23. Repeat the test reading under real conditions and check that the data has been transferred to the host.
24. Correct or optimize the parameter values where necessary via the SOPAS-ET Configuration Software.
25. Save the parameter set as an “*.spr” configuration file to the SOPAS-ET Configuration Software.
The ICR890 System is ready for operation once the **application-specific** setting has been set.

Note Detailed instructions can be found in [Chapters 4 „Installation“, 5 „Electrical installation“](#) and [6 „Operation“](#).

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Abbreviations

BMP	Bitmap (pixel-oriented Windows format for saving photos)
CAN	Controller Area Network (field bus protocol based on the CAN bus)
CCD	Charge Coupled Device
DOF	Depth Of Field
dpi	dots per inch (1 inch = 25.4 mm)
EEPROM	Electrically Erasable Programmable Read Only Memory
FTP	File Transfer Protocol
HTML	Hyper Text Markup Language
I	Input
ICD	Image Capture Device
ICI	Image Capture Illumination
ICR	Image Code Reader (High-end CCD Camera System)
JPEG	Joint Photographic Expert Group (pixel-oriented file format for saving high compression photos, compression process for tiff formats)
LED	Light Emitting Diode
lpi	Lines per inch (1 inch = 25.4 mm)
MAC	Medium Access Control
MLG	Modular Light Grid
MSC	Modular System Controller (MSC800)
MTBF	Mean Time Between Failure
MTTR	Mean Time To Repair
O	Output
RAM	Random Access Memory
ROM	Read Only Memory
SD	Secure Digital Card
SMART	SICK Modular Advanced Recognition Technology
SOPAS-ET	SICK Open Portal for Application and Systems Engineering Tool (PC software for Windows for configuration of the ICR890 System and the MSC800)
PLC	Programmable Logic Controllers
TCP/IP	Transmission Control Protocol/Internet Protocol
UDP	User Datagram Protocol
VMS	Volume Measuring System

Note The ICR890 System components and other components in this document are referred to in the following simplified terms:

- ICR890 High-end CCD Camera System , simplified: ICR890 System
- ICD890 Image Capture Device, simplified: ICD890 Camera
- ICI890 Image Capture Illumination, simplified: ICI890 Illumination
- MSC800 Modular System Controller, simplified: MSC800
- MLG Light Grid (Modular Light Grid), simplified: MLG Light Grid
- VMS4xx/5xx Volume Measuring System, simplified: VMS4xx/5xx
- SICK Open Portal for Application and Systems Engineering Tool, simplified: SOPAS-ET Configuration Software

The register tabs for configuration of the ICR890 System are referred to in the SOPAS-ET Configuration Software online help as "device pages".

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1 Notes on this document

1.1 Purpose

This document provides instructions for **technical staff** on the installation and operation of the following ICR890 System models:

- The ICR890 System equipped with focus control, CCD sensor 8,192 pixels, standard lens (focal distance 135 mm (5.32 in))

This document contains the following information:

- Installation and electrical installation
- Startup
- Operation and configuration
- Maintenance
- Troubleshooting
- Replacing system components

A step-by-step approach is taken for all tasks.

1.2 Target audience

The target audience of this document is persons assigned the following tasks:

Tasks	Target audience
Installation, electrical installation, maintenance, replacing system components	Qualified staff, e. g. service technicians and factory electricians
Startup, operation and configuration	Qualified staff, e. g. technicians and engineers
Operation of the conveyor system	Qualified staff for startup and operation of the conveyor system

Tab. 1-1: Target audience

1.3 Information content

This document contains all the required information for installation, electrical installation and operation of the ICR890 System at the installation location. The **factory configuration** (default setting) of the ICR890 System as a **stand-alone device** is optimized to a **single-side reading** (from above or from the side).

Configuration of the ICR890 System for the **application-specific reading conditions** and operation is carried out via the SOPAS-ET Configuration Software at a Windows™-PC. The SOPAS-ET Configuration Software contains an online help system to facilitate configuration.

Electrical installation of the MSC800 controller for a **ICR890 System** as **stand-alone device** and its configuration is detailed in the *MSC800 Operating Instructions* (no. 8011540). These instructions also described use of the MSC800 as a controller for a **multi-side reading**.

Note Further information on High End CCD Camera Systems, Volume Measurement Systems and Bar Code Scanners is available from SICK AG, Auto Ident division. On the Internet at **www.sick.com**.

1.4 Symbols used

Some of the information in this document is marked specially so that you can access it quickly:



WARNING

Warning!

Warnings are provided to prevent injury to operating personnel or serious damage to the ICR890 System.

- Always read warnings carefully and observe them at all times.

Reference Italics are used to refer to more detailed information elsewhere.

Note Notes indicate special features or characteristics.

Explanation Explanations provide background information on technical correlations.

Recommendation Recommendations help you carry out certain procedures more effectively.

TIP Tips explain settings in the SOPAS-ET Configuration Software.

PROJECT This font indicates a term in the user interface of the SOPAS-ET Configuration Software.



Icons refer to buttons in the user interface of the SOPAS-ET Configuration Software.

“0x0” This font indicates messages output by the ICR890 System.



This symbol identifies sections that describe steps carried out with the SOPAS-ET Configuration Software.



This symbol refers to additional technical documentation.

- There is a procedure which needs to be carried out. This symbol indicates operational instructions which only contain one operational step or operational steps in warning notices which do not have to be followed in any particular order.
Operational instructions comprising several steps are denoted using consecutive numbers.
- ⇒ This symbol indicates a glossary entry.

2 Safety information

This chapter deals with your safety and operator safety.

- Read this chapter carefully **before** using the ICR890 System.

2.1 Authorized users

For correct and safe functioning, the ICR890 System must be installed, operated and maintained by sufficiently qualified staff.

Repairs to the ICR890 System should only be carried out by qualified and authorized SICK AG service staff.

- The operating instructions should be made available to the end user.
- The end user should be briefed and urged to read the operating instructions by the technicians.

The following chapters summarize the required qualifications for the various tasks.

2.1.1 Installation and maintenance

- Practical technical training
- Knowledge of current health and safety regulations at the workplace

2.1.2 Electrical installation and the replacement of system components

- Practical electrical training
- Knowledge of current electrical safety regulations
- Knowledge of startup and operation of the device in each operational area (e. g. conveyor system)

2.1.3 Startup, operation and configuration

- Knowledge of the mechanical and electrical parameters of the conveyor system and the characteristics of the conveyor system regarding startup and operation
- Basic knowledge of the Windows™ operating system
- Basic knowledge of data transfer
- Basic knowledge of designing and setting up (addressing) Ethernet connections for connecting the ICR890 System to the Ethernet
- Basic knowledge of working with an HTML browser (e.g. Internet Explorer) for using the online help
- Basic knowledge of 1-D/2-D code technology

2.2 Intended use

The ICR890 High-end CCD Camera System is an intelligent sensor for the automatic recognition and decoding of 1-D/2-D codes on moving objects in a reading station. In combination with the MSC800 modular system controller, the ICR890 System is used as a stand-alone device for single-side reading, e.g. from above or from the side. For a similarly possible multi-side reading on the conveyor system, the corresponding number of systems is combined with other SICK bar code scanners and with the co-coordinating MSC800.

The intended use of the system results from the following description of the system components and their functions:

- The system consists of the ICD890 Camera, the ICI890 Illumination and a deflection mirror. The ICD890 Camera is installed in a frame together with the ICI890 Illumination as a unit parallel to the deflection mirror, either above the conveyor system (reading from above) or at the side (side reading).
- The necessary object distance information is contained in the ICR890 System either by an MLG Light Grid (in the case of readings from above) or by a VMS4xx/5xx Volume Measurement System for focus control during single or multi-side reading.
- The ICR890 System transfers the reading data via its HOST main data interface (serial RS 232, RS 422/485, Ethernet or CAN), with optionally selectable diagnosis data, to a superordinate host processor for further processing.
The ICR890 System transfers its data via the CAN interface to the MSC800, in combination with the MSC800. The data can then be accessed from the HOST data interface.
- The processed image information of the ICD890 Camera is located on two fast GBit Ethernet channels. The image information can be transferred to the client display at extremely high data transfer rates on a special PC with compatible GBit Ethernet interface cards and GigE Vision Standard licence (real time image data transfer). The high image quality also allows use in OCR and video coding applications.
- Configuration/Operation of the ICR890 System is carried out as standard via the AUX auxiliary data interface (serial RS 232 or Ethernet) using the SOPAS-ET Configuration Software, which runs on a standard client PC. Alternatively, the configuration can also be carried out via the PC connection to the MSC800 (serial RS 232 or Ethernet).

Any warranty claims against SICK AG shall be deemed invalid in the case of other system use or system modifications, this includes modifications during installation and electrical installation or changes to the SICK software.

Note The ICD890 Camera and ICI890 Illumination must not be opened. If the devices are opened, the manufacturer's warranty shall not apply.

2.3 General safety precautions and protection measures

- Read the general safety precautions thoroughly and observe them during all ICR890 System activities. Also observe the warning notices above the operational instructions of each chapter.

2.3.1 Radio interferences



RF interference in case of use in residential areas.

- ICR890 High-end CCD Camera System is exclusively intended for use in an industrial environment.

2.3.2 Installation work



Risk of injuries due to falling components!

The combined weight of the ICD890 Camera and the ICI890 Illumination is approx. 37 kg (81.6 lb) without installation accessories.

- Do **not** carry out installation work alone.
- A second person should always secure components during installation.

2.3.3 Electrical installation work



Risk of injuries due to electrical current!

Connect the MSC800 Controller to the mains power supply (100 to 264 V AC/50 to 60 Hz).

- Observe current safety regulations when working with electrical equipment.

2.3.4 LED radiation from the ICI890 Illumination

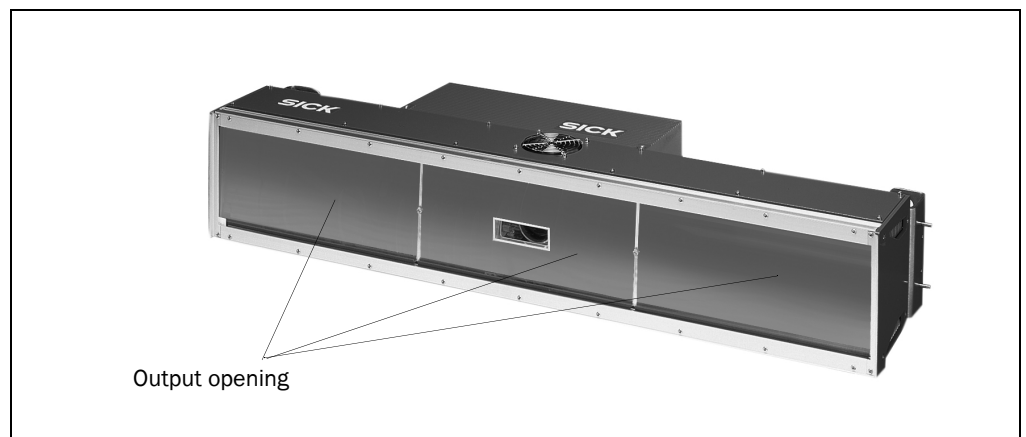


Fig. 2-1: LED radiation outlet opening

LED radiation escapes from the entire front window of the ICI890 Illumination.


Class 1M LED radiation (in accordance with EN/IEC 60825-1)!

Incorrect use can result in hazardous radiation exposure and the LED class being exceeded!

The accessible radiation of the ICR890 Illumination is not hazardous under reasonably foreseeable conditions, provided that the beam width is not reduced by optical instruments, e.g. magnifying glass, lenses or telescopes. Visual glare, loss of colour vision and eye injuries cannot be ruled out.

The entire window surface is the LED radiation outlet opening.

- Do not look directly into the radiation source with optical instruments.
- Do not open the housing. (The illumination is **not** switched off if the housing is opened).
- Always observe the latest valid version of laser protection regulations.

Note The ICR890 Illumination works with LEDs on the $\lambda = 620 \text{ nm}$ (red light) wavelength. The radiation emitted is not harmful to human skin.

Regular maintenance is not required to ensure compliance with laser class 1M.

The ICR890 Illumination operates as follows:

- The reading pulse (pulse source) controls the on and off mechanism of the LED illumination during the reading process. **The LEDs are switched on in pulsed mode during the reading operation depending on the reading gate duration.**
- A time stage (illumination timeout) automatically switches off the illumination during the reading operation after 3 seconds (default setting) following the start of a continuous reading pulse. This, however, does not switch off the reading pulse. The reading pulse should be stopped via a relevant pulse signal. The next reading pulse switches the illumination back on.
- The illumination timeout can be set or switched off within a range of 3 s to 25 h. For safety reasons, the minimum illumination power on time is 3 seconds.

2.4 Quick stop and quick start

The ICR890 System is operated via the MSC800 Controller as standard and can be switched on and off using the controller main switch.

2.4.1 Switch off the ICR890 System

- Switch off the power supply of the MSC800.

When the system is switched off the following data is lost:

- Application-specific parameter sets in the ICR890 System and in the MSC800 Controller which were only **temporarily** saved in the devices
- The last reading result of the ICR890 System
- Daily operating hours counter of the ICR890 System

2.4.2 Switch on the ICR890 System

- Switch on the power supply of the MSC800 again.
The ICR890 System starts up using the most recent **permanently** saved configuration. The daily operating hours counter is reset.

2.5 Environmental information

The ICR890 System has been constructed with minimum environmental pollution in mind. Excluding the housing, the system does not contain any materials using silicone.

2.5.1 Energy requirements

The ICR890 System is electrically powered via the MSC800 Controller as standard (functional extra-low voltage in accordance with IEC 364-4-41).

The following power consumption details apply to the system components and the controller:

- ICD890 Camera: typically 75 W with 24 V DC $\pm$ 10 % (via MSC800 power supply)
- ICI890 Illumination: typically 350 W with 24 V DC $\pm$ 10 % (via MSC800 power supply)
- MSC800-0000 logic controller: typically 10 W with 24 V DC $\pm$ 10 %

2.5.2 Dispose of the device after decommissioning

At present SICK AG will not accept the return of any devices which can no longer be operated or repaired.

- Inoperable or irreparable devices must be disposed of in an environmentally friendly manner and in accordance with valid country-specific waste disposal guidelines.

The design of the ICR890 System allows for its separation as recyclable secondary raw materials and hazardous waste (electronic scrap).

Please see [Chapter 7.4 Disposal, page 95](#).

Note The battery on the internal PC card of the ICD890 Camera must be removed before the device is scrapped.

- Dispose of the battery separately in accordance with ROHS regulations (Europe).

Notes:

3 Product description

This chapter describes the design, the features and the functions of the ICR890 System.

- For installation, electrical installation and startup assistance as well as system configuration using the SOPAS-ET Configuration Software, please read this chapter **prior** to carrying out any of the tasks.

3.1 Design

The ICR890 System consists of the ICD890 Camera (Image Capture Device), the ICI890 Illumination (Image Capture Illumination) and a deflection mirror. The ICR890 System is operated **in combination with the MSC800** (Modular System Controller) via a CAN bus. The MSC800 supplies the ICR890 System with power.



For further information on the MSC800, see the *MSC800 Operating Instructions* (no. 8011540).

External sensors are required for the reading pulse, detection of the object distance and for creation of the increment signal. These sensors and the superordinate host processor are connected to the MSC800.

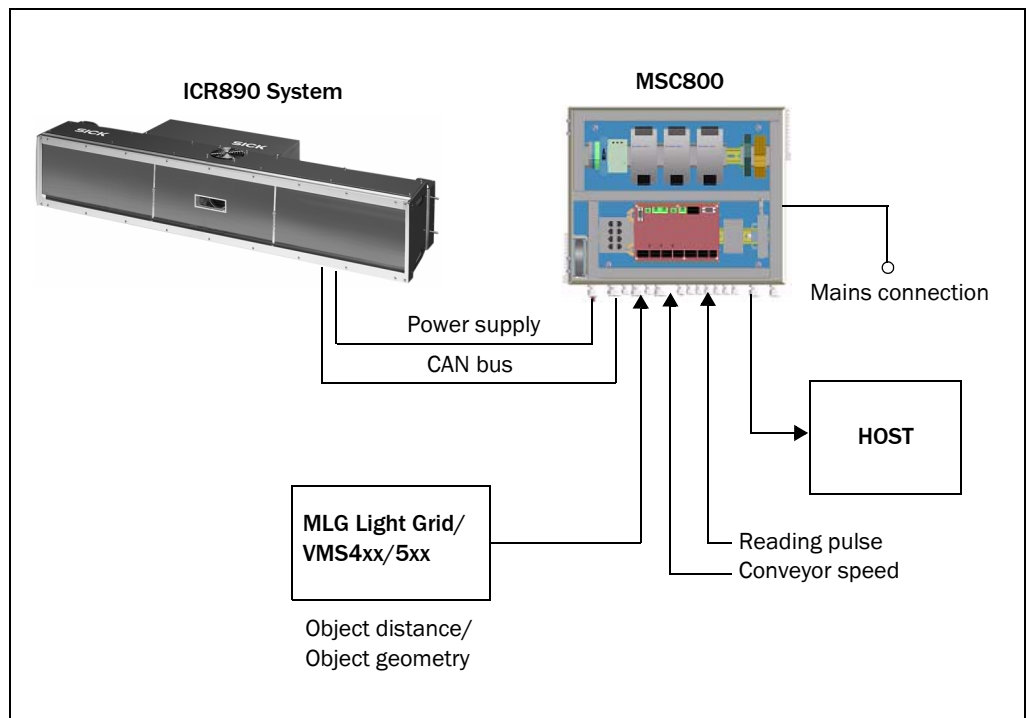
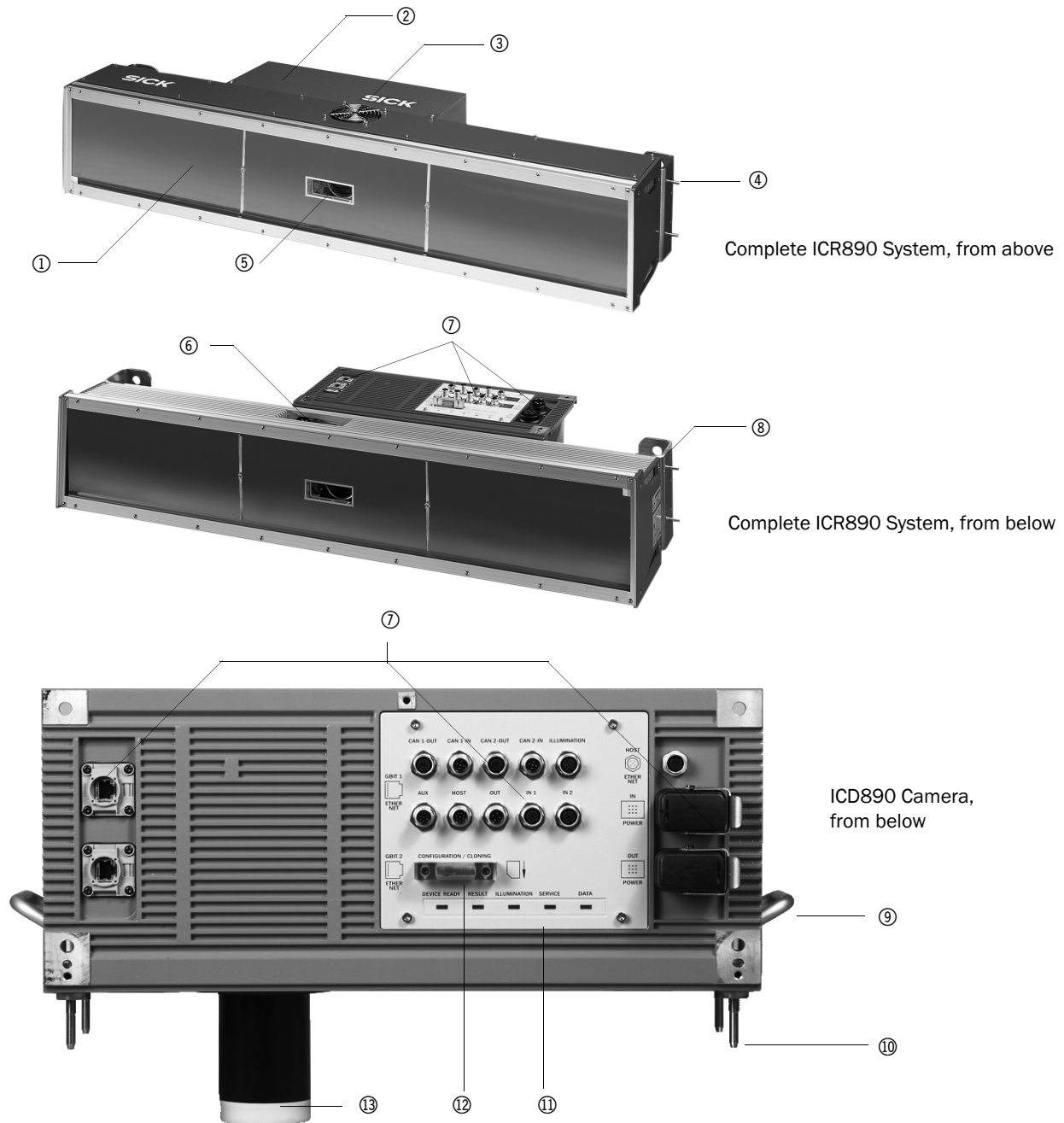


Fig. 3-1: ICR890 System in combination with the MSC800 (single-side reading)

Alternatively, connection of the external sensors and the superordinate host processor can be carried out directly at the ICR890 System.

3.1.1 Device view

**Legend:**

- | | | |
|---|--|--|
| ① ICI890 Illumination | ⑤ ICD890 Camera reading window | ⑨ Handhold for camera (2 x) |
| ② ICD890 Camera | ⑥ Electrical connections for the ICI890 Illumination | ⑩ Threaded centering pin for fixing to the ICI890 Illumination |
| ③ Air inlet opening for cooling the ICI890 Illumination | ⑦ Electrical connections for the ICD890 Camera | ⑪ LEDs for status indicator (5 x) |
| ④ Guide pins (4 x) for use in 180° bracket | ⑧ Fixing for bracket (2 x) | ⑫ SD memory card for parameter cloning |
| | | ⑬ Lens protection tube |

Fig. 3-2: View of the ICD890 camera and the ICI890 Illumination

3.1.2 Included in delivery

Delivery of the ICR890 System includes the following components:

Piece(s)	Components	Comment
1	ICD890 Camera	ICR890 System
1	ICI890 Illumination	
1	Deflection mirror	
1	MSC800	Without connection cables
1	MLG Light Grid (preconfigured) height distance detector with connection cable and installation kit	Application-specific
1	- or - Object distance detector VMS4xx/5xx with connection cables and installation kit	
4	180° brackets with installation accessories	For ICR890 System and deflection mirror
1	WL18-3 Reading Pulse Sensor (pulse photoelectric reflex switch) with connection cable and installation kit	Triggering the reading procedure
1	Connection cable	For the power supply of the ICR890 System
1	Connection cable	For the power supply of the ICI890 Illumination via the camera
1	Connection cable	For control of the ICI890 Illumination via the camera
1	CAN bus data link	For networking the ICR890 System with MSC800 via the CAN bus
1	Terminal resistance	For CAN bus termination at the ICR890 System
1	GigE Vision Standard licence for real time image data transfer	Optional (application-specific)
1	Incremental encoder, resolution 10 mm (394 mil)/pulse	Optional (application-specific)
1	- or - Incremental encoder, resolution 0.2 mm (7.9 mil)/pulse (using VMS4xx/5xx)	
	Installation frames	Optional (application-specific)
1	Notes on Device with electrical connection diagram as primary information	Included in the device packaging of the ICR890 System
min. 1	CD-ROM	Depending on number of ordered devices
	Operating Instructions ICR890 System in printed form, in German and/or English	Optional, depending on the number of issues explicitly ordered upon purchase

Tab. 3-1: Included in the delivery of the ICR890 High-end CCD Camera System

An overview of system components, in stock installation accessories, incremental encoders, cables and plug connections is available in [Chapter 10.4 Ordering information, page 113](#).

3.1.3 Contents of the CD-ROM

- **“SOPAS-ET Engineering Tool”**: Configuration software for Windows™ PCs with integrated online help system (HTML files)
- **ICR890 Operating Instructions**: PDF version in German and English as well as further publications for MSC800, VMS4xx/5xx
- **“Acrobat Reader”**: Freely available PC software for reading PDF files

Note The current versions of publications and programs on the CD-ROM can be downloaded at www.sick.com.

3.1.4 Device versions

The system components are available in the following versions:

Type	Order no.	Description
ICD890-0000000	1027582	Camera with lens (focal distance 135 mm (5.32 in)), standard device
ICD890-0000001	1040277	the same as 1027582, but includes GigE Vision licence
ICI890-00000	1028219	ICI890 Illumination

Tab. 3-2: System component versions

3.2 System requirements

3.2.1 General system requirements

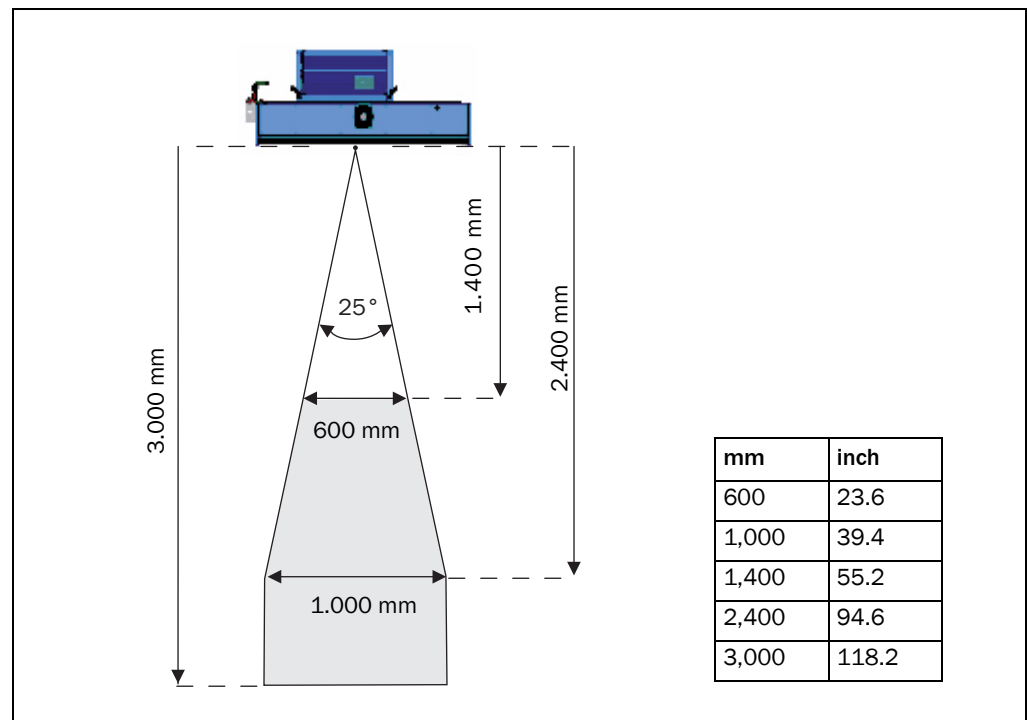


Fig. 3-3: Work area of the ICR890 System (standard device)

Requirement	Value	Comment
Max. reading distance	3,000 mm (118.2 in)	from reading window (Fig. 3-3, page 26)
Shortest permissible distance to the object	1,400 mm (55.2 in)	
Aperture angle	25°	Work area up to 2,400 mm (94.6 in)
Max. track width	1,000 mm (39.4 in)	also see reading area diagram in Fig. 9-1, page 106
Achievable ICD890 Camera resolution		depends on the distance to the object and on the conveyor speed (see Chapter 3.4.12 Data interfaces, page 39)
Max. conveyor speed	4.8 m/s (945 ft/min)	with pixel size 0.25 mm (9.8 mil)

Tab. 3-3: General system requirements (standard device)

3.2.2 Installation requirements

- Typical space requirements above the highest object (for reading from above): application-specific
- Unobstructed view of the objects for the ICR890 System
- Stable installation frames with sufficient load capacity and measurements suited to the ICR890 System (see [Chapter 9.5 System dimensional drawing ICR890, page 108](#))
- Four 180° brackets for the ICR890 System and the deflection mirror (included in delivery)
- Shock absorbent and vibration free attachment

Note An installation frame made of 80 mm (3.15 in) item aluminium profiles can be used for simple system installation ([Fig. 3-4](#)). The 180° brackets are aligned to these profiles.

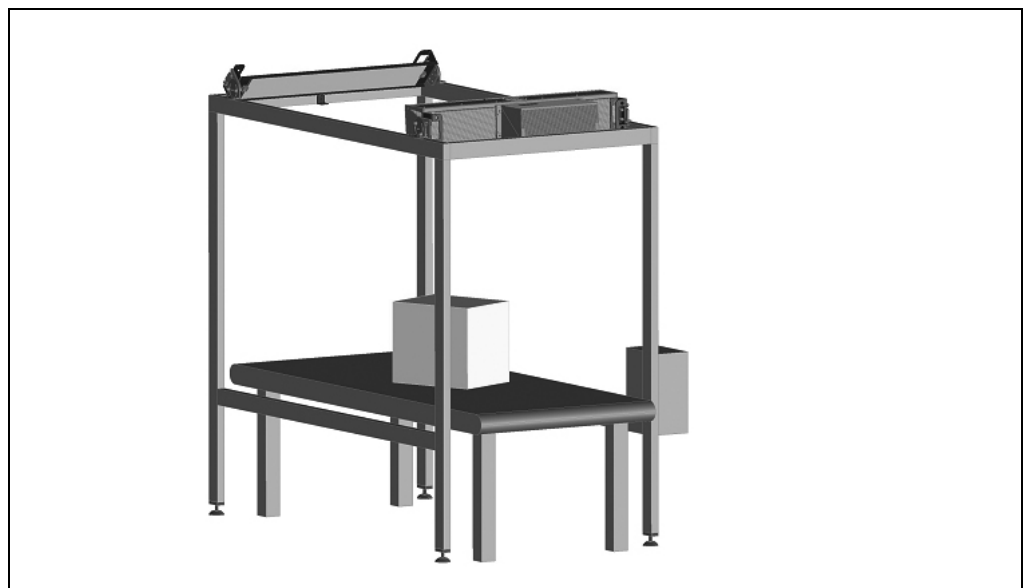


Fig. 3-4: Example of simple system installation on the installation frame

3.2.3 Electrical installation requirements

- Power supply (via MSC800): 100 to 264 V AC/50 to 60 Hz
- Reading pulse sensor (start/stop), e.g. photoelectric reflex switch (included in delivery): For detecting an object with external reading pulse
- Additional appropriate reading pulse sensor (stop), e.g. photoelectric reflex switch: For detecting the end of pulse with extended external reading pulse
- Preconfigured MLG Light Grid(included in delivery): when reading from above to detect the object distance
- VMS4xx/5xx Volume Measurement System: when reading from the side or for multi-side reading to detect the object distance
- Suitable incremental encoder, e.g. no. 2039455 (resolution 10 mm (394 mil)/pulse) or no. 2039457 (resolution 0.2 mm (7.9 mil)/pulse) when using the VMS4xx/5xx. Device is included in delivery depending on the system configuration
- Host processor with RS 232, RS 422/485 data interface or Ethernet: For further processing of the reading data via MSC800 also PROFIBUS-DP
- Suitable visualization PC or PLC: To display the system status
- Connection cables: See [Chapter 5.3.4 Assembled cables \(overview\), page 63](#)

3.2.4 Operation requirements

- PC in the following version:
 - Minimum Pentium III, 500 MHz, 128 MB RAM, CD drive, RS 232 serial data interface or Ethernet interface card, mouse (recommended) and colour monitor (recommended resolution 1,024 x 768 pixels)
 - Operating system Windows 98™, Windows NT4.0™, Windows ME™, Windows 2000™ or Windows XP™
 - Free storage space on the hard drive: Approx. 100 MB for the SOPAS-ET Configuration Software (V. 2.08) with help files and approx. 70 MB for “Acrobat Reader“
- Connection cables see [Chapter 5.3.4 Assembled cables \(overview\), page 63](#)
- PC HTML browser, e.g. Internet Explorer™: For online help system to the SOPAS-ET Configuration Software
- Special PC for client display of the processed camera image information in real time equipped with the following:
 - Two 1 GBit Ethernet “IntelPro/1000 network card“ interface cards with 8254x (x = 0, 1, 2, 4, 5, 6, 7) chip set
 - GigE vision standard licence for real time image data transfer

3.3 Product features and functions (overview)

High-end CCD Camera ICD890

- CCD line with 8,192 pixels (standard device)
- Dynamic focus setting
- Lens with 135 mm (5.32) focal distance (standard device)
- Reading area 1,400 to 3,000 mm (55.2 to 118.2 in) (standard device)
- Image resolution 170 to 350 dpi (standard device)
- Conveyor speed max. 4.8 m/s (945 ft/min) with 0.25 mm (9.8 mil) pixel size
- Scanning frequency max. 19.1 kHz (standard device)
- Can be adapted to the print quality of the code
- Analysis area of the CCD line can be restricted
- Real time image output (grey values: “*.bmp“ or “*.jpg“)

User safety and convenience

- Robust, compact metal housing, enclosure rating max. IP 64, CE mark
- Laser class 1M, switching off the LED ICD890 Illumination in case of prolonged active reading gate or if the output capacity is exceeded, minimum power on-time 3 s
- Automatic self-test on system startup
- Diagnosis tools for system setup and system (distance) monitoring
- Configurable reading diagnosis data display in two reading result formats
- Operational data retrieval, error code display on request in case of errors
- Activatable test string function for signalling readiness for operation
- Password protected configuration mode
- Back up of configuration parameter values (cloning) also on SD memory card (can be removed when replacing the camera)
- Future proof due to firmware update (flash PROM) via data interface
- Future proof SOPAS-ET Configuration Software
- Extended power supply scope
- Necessary maintenance or service task displayed via LED and system report
- The camera or illumination can be replaced within 20 mins

Convenient operation/configuration

- Configuration (online/offline) and display of image memory contents via the SOPAS-ET Configuration Software (incl. help system)
- Status indicators via five LEDs

Operating modes

- Configuration mode
- Reading operation

Reading operation mode

- Start/Stop operation
- Object tracking (max. 10 objects per second, minimum gap 50 mm (1.97 in))

1-D/2-D code detection

- Data Matrix ECC200 (PDF417 in preparation)/all conventional bar codes
- Max. number of 1-D codes: 50 per reading pulse
- Max. number of 2-D codes: 10 per reading pulse
- Separation of identical codes of the same code type using the code position
- Output sorting: Code position, FIFO, LIFO, code lengths list
- Manipulation of output strings via filter or format masks

Data communication

- Main data interface HOST: Configurable output format of the reading result, communication redirectable to Ethernet interface
- AUX auxiliary data interface: Permanent output format with special diagnosis functions, communication redirectable to Ethernet interface
- Two 1 GBit Ethernet interfaces for fast image output

Reading pulse

- External reading pulse via switching input(s) or data interface

Electrical interfaces

- HOST data interface: RS 232, RS 422/485 serial, Ethernet or CAN (various transfer rate and protocol configurations possible)
- AUX data interface: RS 232, RS 422/485 serial, Ethernet or CAN (permanent transfer rate, data format and protocol)
- CAN interface for integration into SICK CAN-SENSOR Network with the MSC800 or into a CAN Open Network
- Ethernet interface (10/100 MBps), TCP/IP and FTP
- Two 1 GBit Ethernet interfaces, FTP and GigE Vision Standard
- Two digital switching inputs for external reading pulse sensor and incremental encoder via optocoupler
- Two digital switching outputs for signalling definable results in the reading process (system status)
- Connection to PROFIBUS-DP via MSC800

Connection technology (design)

- Data and function interfaces: M12 connector for industrial use
- GBit Ethernet: Phoenix VARIOSUB RJ-45 sockets, enclosure rating IP 67
- Power supply: Harting connectors

3.4 Method of operation

This ICR890 System is an intelligent sensor system for automatic and non-contact detection and decoding of 1-D/2-D codes. In principle, the codes can be detected on any side of moving objects in a conveyor system.

For **single-side readings**, the codes are detected from above, below or from the side using a **camera**. In order to allow easier installation and setup of the system, the camera image is recorded using a deflection mirror.



Fig. 3-5: The ICR890 System at a conveyor system, single-side reading from above

Note Several cameras can be combined to allow detection of several sides in one passage (**multi-side reading**). The method of operation is described here using the example of single-side reading from above.

The system is operated in combination with an MSC800 Controller. The reading results are output at the data interfaces via the controller. External sensors deliver information via the reading pulse, the object distance and the conveyor speed.

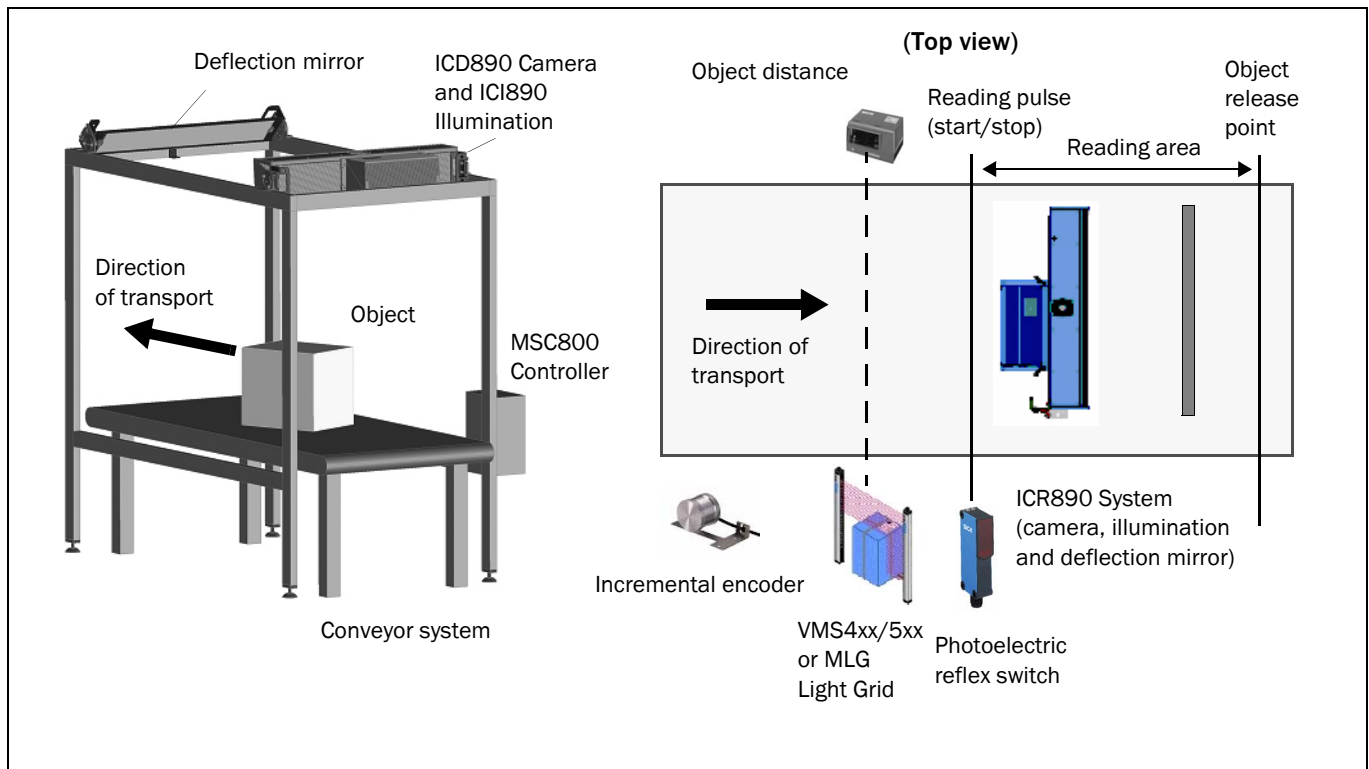


Fig. 3-6: System diagram for single-side reading from above

3.4.1 Reading configuration

The **ICD890 Camera** detects 1-D/2-D codes line by line with the help of a CCD line. The lines are written successively and with a high frequency into an image storage. Continuous feeding of the object on the conveyor system produces a two-dimensional image of the object.

Note The ICR890 System cannot recognize codes on stationary objects.

A moving 1-D/2-D code on an object is displayed as a grey level matrix in the image storage. Contrast jumps are analyzed in order to scan the codes. The threshold value can be adapted to the ambient conditions.

For more rapid analysis, the analysis area can be restricted to across the direction of transport (code position).



The SOPAS-ET Configuration Software can, among other things, be used to configure features, such as the code position and the symbol contrast:

PROJECT TREE, ICR890, PARAMETER, READING CONFIGURATION, register tab CODELABEL PROPERTIES

Moreover, the image resolution across the direction of transport (digital zoom in dpi) and in the direction of transport (dynamic scanning frequency in lpi) can be configured:

PROJECT TREE, ICR890, PARAMETER, READING CONFIGURATION, register tab IMAGE CAPTURING PROPERTIES

3.4.2 Object trigger control

In order to initiate a reading process, the ICR890 System requires an appropriate signal (trigger). The start signal is emitted via an external reading pulse sensor (**photoelectric reflex switch**) as standard. As soon as an object has passed the reading pulse sensor, an "internal reading gate" opens for the reading process.

Alternatively, a command activates the reading process via a data interface or the CAN-SENSOR network.



The trigger source can be configured using the SOPAS-ET Configuration Software:

PROJECT TREE, ICR890, PARAMETER, READING CONFIGURATION, OBJECT TRIGGER CONTROL, register tab START/STOP OF OBJECT TRIGGER

3.4.3 Focus control

For dynamic focus control, the ICD890 Camera requires continuous information on the distance to the object surface. This data is provided by a lateral **MLG Light Grid** for readings from above. The object dimensions are taken from the **VMS4xx/5xx Volume Measurement System** and processed via the MSC800 for readings from the side.



The SOPAS-ET Configuration Software can, among other things, be used to configure features, such as the default position and the source of the distance measurement:

PROJECT TREE, ICR890, PARAMETER, READING CONFIGURATION, FOCUS CONTROL, register tabs OPTIONS and DISTANCE MEASUREMENT SOURCE

3.4.4 Illumination control

The area which is to be read must be illuminated with a high-performance LED illumination when recording with the camera. The **ICI890 Illumination** produces a thin red illuminated area (wavelength $\lambda = 620 \text{ nm}$).

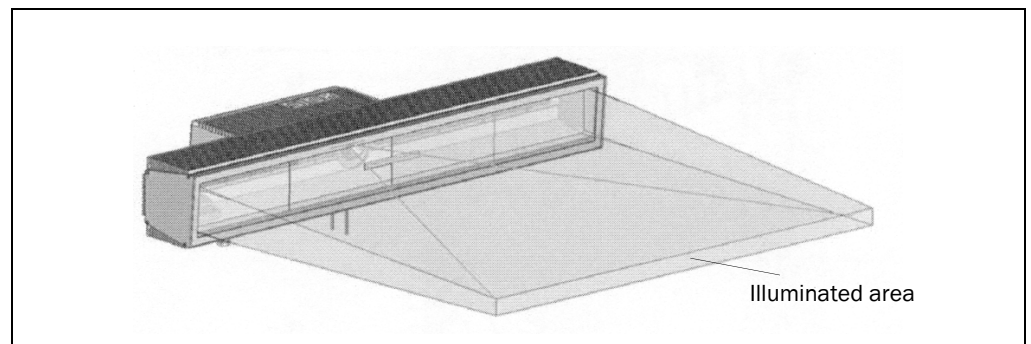


Fig. 3-7: Diagram of the illumination with illuminated area

During reading from above, the light is deflected onto the conveyor system using the **deflection mirror**.



Fig. 3-8: ICR890 System with deflection mirror for reading from above

The illumination is controlled by the camera and can be switched on permanently or for the duration of the internal reading gate.

If the reading gate does not run to the end due to an error (e. g. when the conveyor system comes to a halt), the illumination automatically switches off once the settable timeout has expired. In order to prevent epilepsy, the minimum power-on time of the illumination is 3 s.



The illumination mode and the timeout for the ICR890 Illumination can be configured using the SOPAS-ET Configuration Software:

PROJECT TREE, ICR890, PARAMETER, READING CONFIGURATION, LAMP CONTROL, register tab
ILLUMINATION MODE

3.4.5 Position

To ensure correct functioning of the ICR890 System, the position and angle of the camera and the deflection mirror have to be adjusted to the conveyor level.

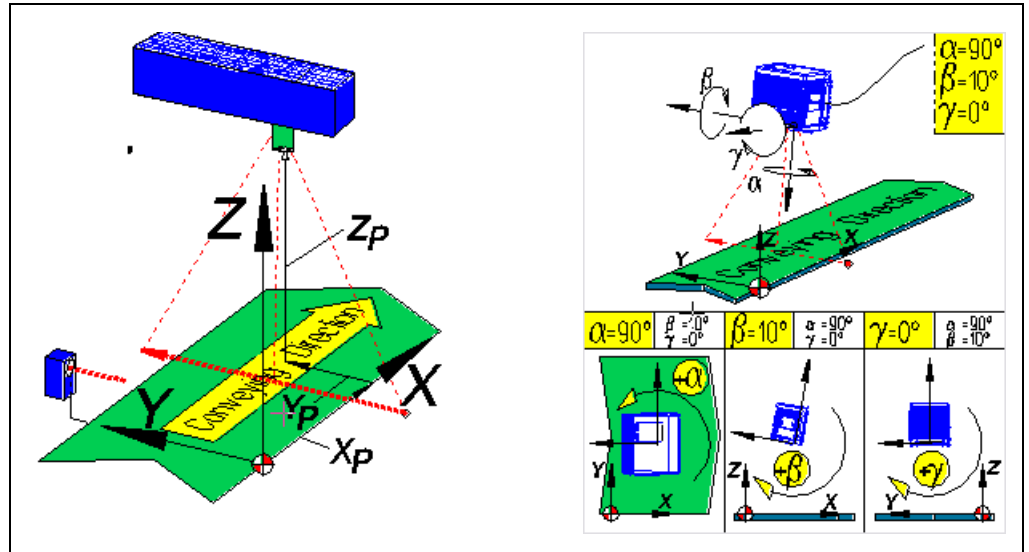


Fig. 3-9: Position of the ICR890 System and the tilt angle

The position of the object trigger control (photoelectric reflex switch) on the outer right-hand edge of the conveyor system is considered the point of reference, as viewed in the direction of transport.

The α and γ angles must be set depending on the position of the System (e. g. on top or at the side). In order to prevent direct reflectance, the light must be incident at an angle of approx. 15° (β = skew) on the object surface against the direction of transport.



The position and the angle of the camera and the deflection mirror can be configured using the SOPAS-ET Configuration Software:

PROJECT TREE, ICR890, PARAMETER, POSITION, register tabs OFFSET, COORDINATES and ANGLES

3.4.6 Increment configuration

In order to control the camera line frequency, the ICR890 System requires information on the conveyor speed. An external **incremental encoder** delivers pulses which are used to determine the current conveyor speed.

The conveyor speed results from the number of pulses and the resolution of the external incremental encoder.



The increment source and resolution/speed can be configured using the SOPAS-ET Configuration Software:

PROJECT TREE, ICR890, PARAMETER, INCREMENT CONFIGURATION, register tab INCREMENT

3.4.7 Image requirement

The recorded image can be generated irrespective of the decoding result for further processing via the GBit Ethernet interface. This enables, e. g., an analysis if decoding has been unsuccessful.

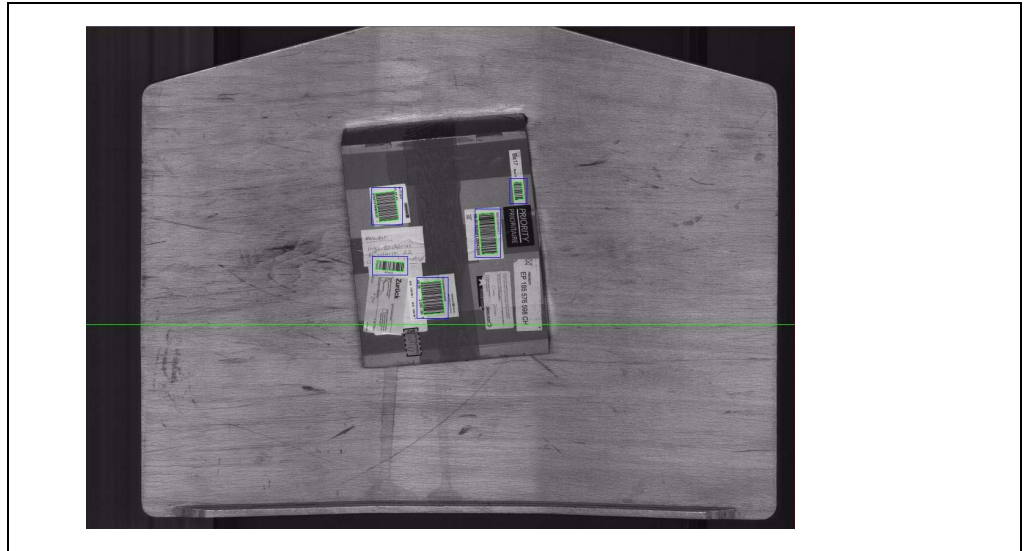


Fig. 3-10: Example of an image recording for analysis

If data processing has been successful (decoding), the marking of the corresponding image areas can also be displayed.



The image format and the scaling/quality can be configured using the SOPAS-ET Configuration Software:

PROJECT TREE, ICR890, PARAMETER, IMAGE ACQUISITION, register tab REQUEST

Decoding

The recorded image is analyzed by the ICR890 System. This identifies regions of interest in which codes are suspected.

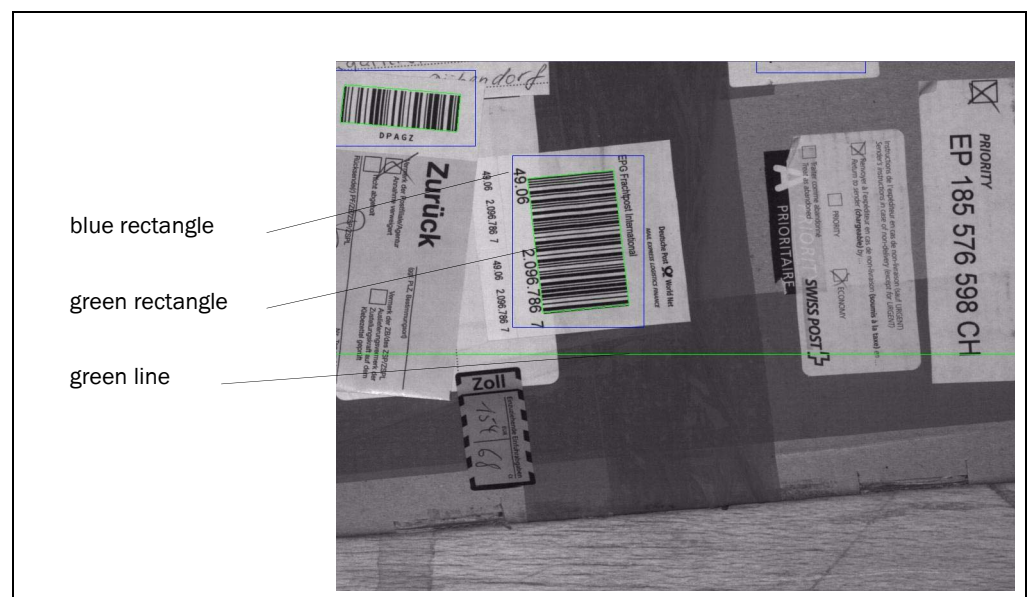


Fig. 3-11: Image analysis (blue rectangle: Regions of interest; green rectangle: Successful decoding; green line: Decoder runtime at end of the reading pulse)

3.4.8 Code configuration

The ICR890 System can decode the following code types:

1-D codes (bar codes)

- Codabar
- Code 39
- UPC/EAN family
- 2/5 Interleaved
- Code 93
- Code 128 family

2-D codes

- Data Matrix EEC200
- PDF417 (in preparation)



The code types for 1-D and 2-D codes can be selected using the SOPAS-ET Configuration Software:

PROJECT TREE, ICR890, PARAMETER, 1D CODE CONFIG., register tab SYMBOLOGIES

PROJECT TREE, ICR890, PARAMETER, 2D CODE CONFIG., register tab SYMBOLOGIES

The selected code types can be configured individually. The SOPAS-ET Configuration Software has individual register tabs for each type.

3.4.9 Data processing

Start/Stop operation

There is only one **object** in the reading area during start/stop operation, i. e. all the read codes should be unambiguously assigned to the object. The start and stop of the reading process control two reading pulse sensors at the beginning and at the end of the reading area as standard ([Fig. 3-12, page 38](#)). The distance between each sensor is determined by the size of the reading area. The reading process can be alternatively controlled with command strings via the data interface. The output of the reading results is carried out either at the end of the reading pulse (the rear edge of the object has left the end of the reading area) or during the reading pulse if certain parameterizable conditions have been fulfilled.

Tracking operation

During the reading process, a **maximum of 10 objects** can be simultaneously situated, one behind the other, in the tracking operation, i. e. the ICR890 System must be able to unambiguously assign the read codes to the objects ([Fig. 3-12](#)). A reading pulse sensor controls initiation of the reading process at the start of the reading area as standard (see [Chapter 3.4.2 Object trigger control, page 33](#)), the end is determined by the object release point. This also defines the size of the resulting reading area.

A regular pulse is required in order to track objects in the reading area. This is generated by the external incremental encoder, which delivers a constant pulse at least every 10 mm (394 mil) of movement in the direction of transport (see [Chapter 3.4.6 Increment configuration, page 35](#)). This allows the ICR890 System to generate a clear display of the distance between the reading pulse sensor and the object release point. Any fluctuations during startup of the conveyor technology or reductions in speed caused by heavy objects are also detected. For clear separation of consecutive objects, a gap of at least 50 mm (1.97 in) is required. Reading results for an object are displayed after the rear edge of the object has passed the object release point. Alternatively, the reading process can be initiated by a command string via the data interface.

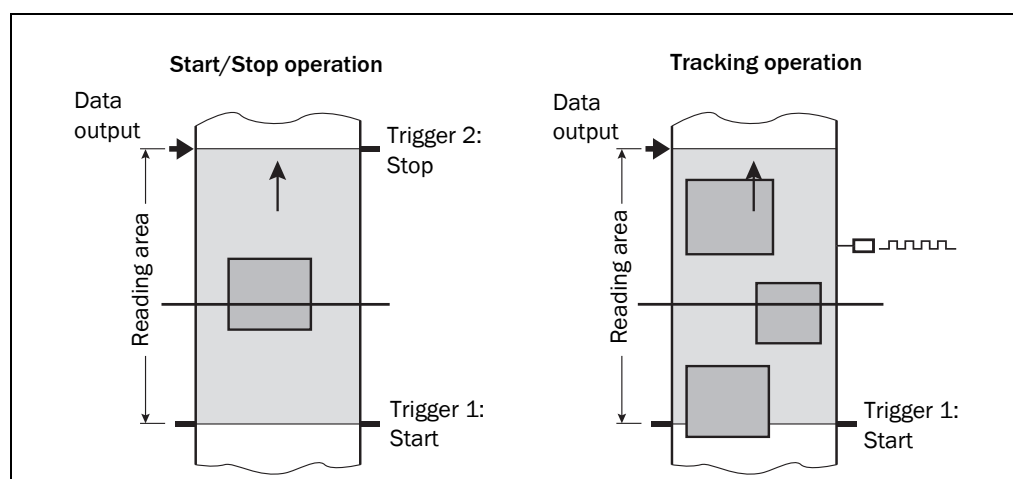


Fig. 3-12: Reading operation modi of the ICR890 System in stand-alone operation



The reading operation mode and object release point can be configured using the SOPAS-ET Configuration Software:

PROJECT TREE, ICR890, PARAMETER, DATA PROCESSING, register tab TRACKING

3.4.10 Output format

The reading result (decoded codes) is displayed via definable data interfaces. Two different output formats (telegrams) can be defined for this task.



Two output formats can be configured using the SOPAS-ET Configuration Software:

PROJECT TREE, ICR890, PARAMETER, DATA PROCESSING, OUTPUT FORMAT

3.4.11 Network

Although all important interfaces for displaying the reading results are available at the ICR890 System, the system is operated via the MSC800 Controller as standard. The MSC800 assumes system coordination for multi-side readings. The ICR890 System and the MSC800 can be networked via the CAN bus.



The network parameters can be configured using the SOPAS-ET Configuration Software:

PROJECT TREE, ICR890, PARAMETER, NETWORK ARCHITECTURE, register tabs NETWORK OPTIONS and MASTER/SLAVE

3.4.12 Data interfaces

Numerous data interfaces are available at the ICR890 System.

Data interface	Connection	Function
Serial host interface	HOST	Preparation of the reading result for further processing by the host processor
Serial host interface	AUX	Reading diagnosis
Ethernet	HOST ETHERNET	Preparation of the reading result for further processing by the host processor
Gbit Ethernet:	GBIT ETHERNET	Preparation of the image data of the current reading for further processing
CAN bus	CAN 1 (Out/In), CAN 2 (Out/In)	Networking one or several systems with the MSC800

Tab. 3-4: Data interface function



The data interfaces can be configured using the SOPAS-ET Configuration Software:

PROJECT TREE, ICR890, PARAMETER, INTERFACES, SERIAL

PROJECT TREE, ICR890, PARAMETER, INTERFACES, ETHERNET

PROJECT TREE, ICR890, PARAMETER, INTERFACES, GBIT ETHERNET

PROJECT TREE, ICR890, PARAMETER, INTERFACES, CAN

3.4.13 Digital outputs

Under certain system conditions (e. g. for unsuccessful decoding “No Read”), two independent switch signals can be generated at both digital outputs and can be used to display the system status.



The digital outputs can be configured using the SOPAS-ET Configuration Software:
PROJECT TREE, ICR890, PARAMETER, DIGITAL OUTPUTS, register tabs OUTPUT 1 and OUTPUT 2

3.4.14 Digital inputs

The external sensor for the object trigger control (photoelectric reflex switch) and the incremental encoder can, e. g., be connected to the two digital inputs.



The digital inputs can be configured using the SOPAS-ET Configuration Software:
PROJECT TREE, ICR890, PARAMETER, DIGITAL INPUTS, register tabs SENSOR 1 and SENSOR 2

3.5 Indicators and control elements

3.5.1 User interface

The ICR890 System is configured application specifically using the SOPAS-ET Configuration Software (see [Chapter 6.3.1 Overview of the configuration procedure, page 81](#)). The software for this runs on a PC which must be connected to one of the data interfaces ("HOST/AUX" RS 232 or "HOST Ethernet") of the MSC800 or the ICD890 Camera.

As an alternative to the SOPAS-ET Configuration Software, command strings are available upon which the user interface of the SOPAS-ET Configuration Software is based (see [Chapter 10.2 Configuring the ICR890 System with command strings, page 111](#)).

In case of an error, startup and diagnosis can only be carried out via the SOPAS-ET Configuration Software. The system works fully automatically in normal operation. Further operating elements are not available at the ICR890 System.

Parameter set on the SD memory card

The configured parameter values are saved as a parameter set in the internal EEPROM of the ICR890 System and on the SD memory card of the ICD890 Camera (cloning). If the camera needs replacing, the memory card allows convenient and rapid transfer of the parameter set to a new device (also see [Chapter 7.3 Replacing a system or a component, page 93](#)).

Note To prevent data loss, the SD memory card should only be removed or inserted in a new device when the system is switched off.

The card can be accessed from the rear of the camera and is located behind a cover on the panel with the electrical connections.

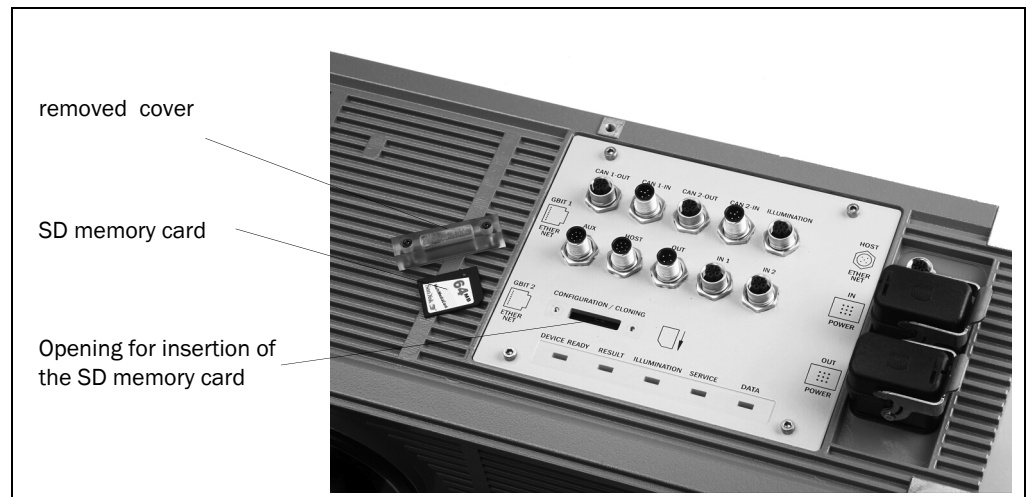


Fig. 3-13: SD memory card for parameter set

3.5.2 LEDs of the ICD890 Camera

There are five LEDs for the electrical connections of the ICD890 Camera. These LEDs display the operating status, the status of the reading result, the illumination switch status, necessary maintenance or service tasks and data transfer to the serial main data interface.

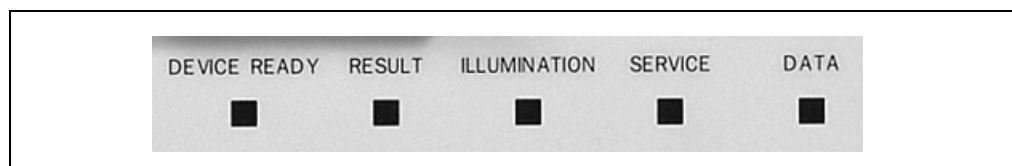


Fig. 3-14: LEDs at the ICD890 Camera

The LEDs indicate the following:

LED	Colour	Indication
DEVICE READY	green	- Lights up after switching on and a successful self-test - Lights up permanently during reading operation - Goes off when the configuration mode changes
RESULT	green	Lights up during reading operation after a successful reading (default setting: Good Read, 100 ms)
ILLUMINATION	green	Lights up during reading operation if the ICD890 Illumination of the camera is switched on (depends on the reading pulse)
SERVICE	red	- Flashes if system maintenance is required - Lights up permanently if the system requires servicing
DATA	yellow	Flashes during reading operation if data is being transferred between the ICD890 System and the main data interface at the host

Tab. 3-5: LED indications

3.6 Impacts on the reading quality

The image/reading quality of the ICD890 Camera is affected by the resolution across the direction of transport (pixel resolution, dpi) and the resolution in the direction of transport (line resolution, lpi). A quadratic resolution is selected in the default setting (dpi = lpi).

Max. pixel resolution across the direction of transport

The pixel resolution across the direction of transport depends on the reading distance to the object. [Fig. 3-15](#) shows the curve gradient for the standard 135 mm (5.32 in) lens and the CCD with 8,192 pixels.

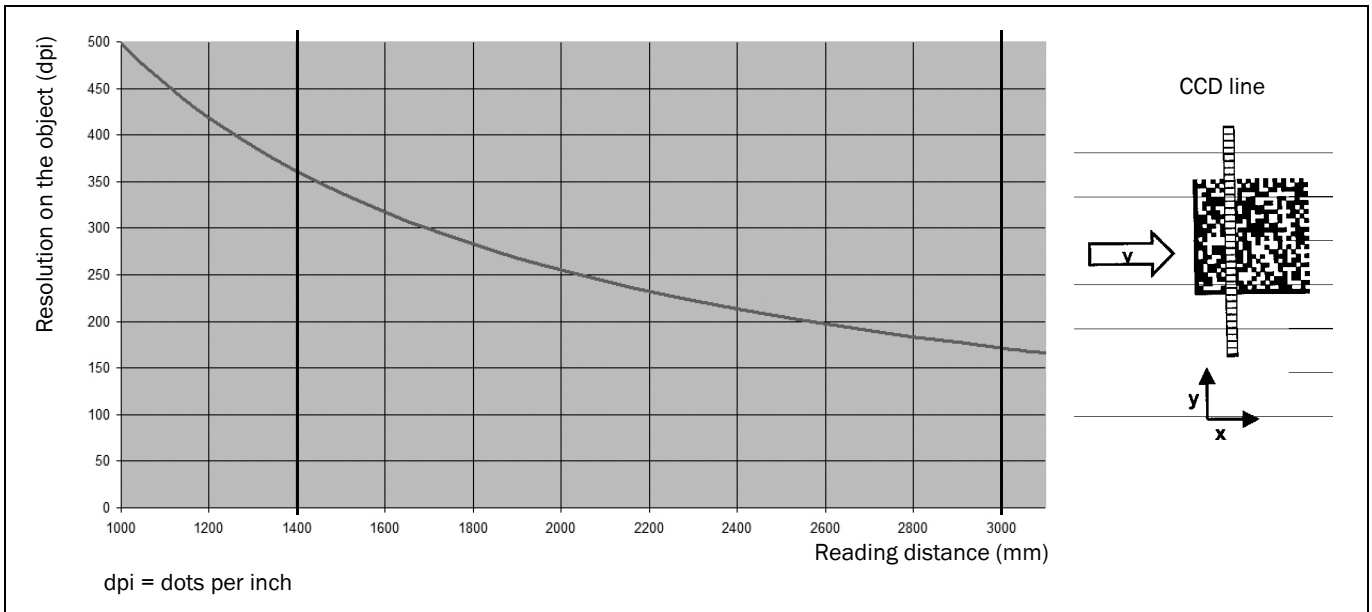


Fig. 3-15: Pixel resolution across the direction of transport (standard device, 135 mm (5.32 in) lens)

Max. line resolution in the direction of transport

The line resolution in the direction of transport depends on the conveyor speed. [Fig. 3-16](#) shows the curve gradient for the standard 135 mm (5.32 in) lens and the CCD with 8,192 pixels with a max. line rate of 19.1 kHz.

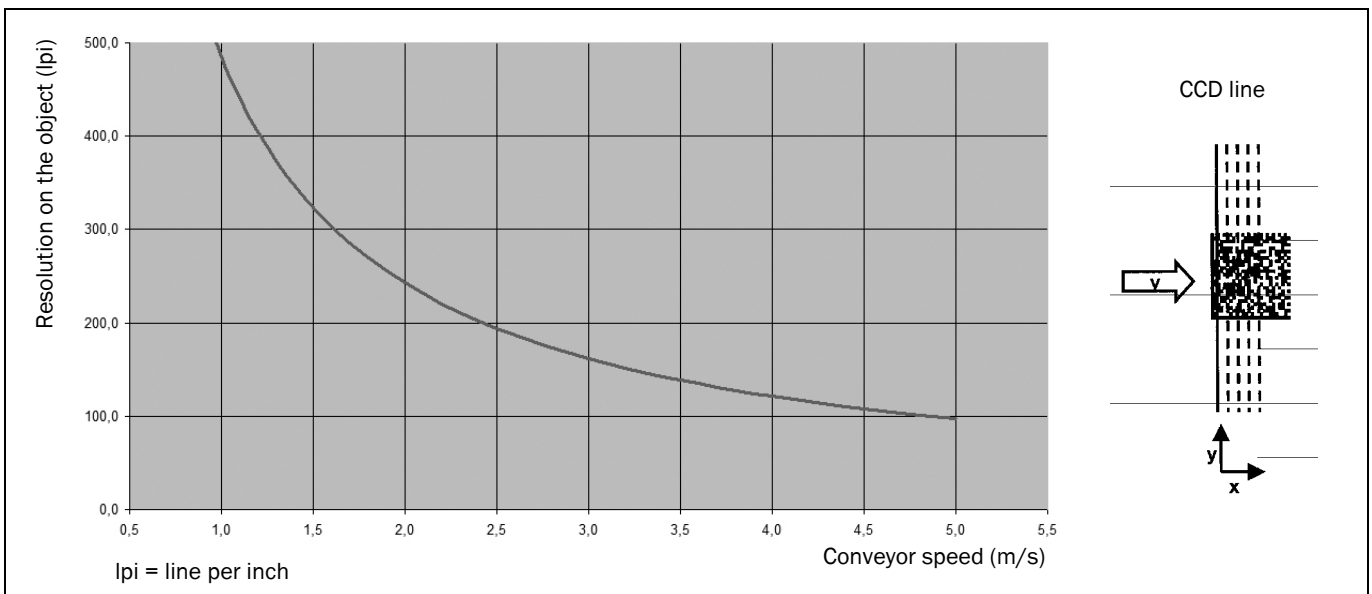


Fig. 3-16: Line resolution in the direction of transport (standard device, 8,192 pixels CCD sensor)

Notes:

4 Installation

4.1 Overview of installation sequence

This chapter describes the installation sequence for components of the ICR890 System and external components.

Note Prerequisite for the installation of components is a suitable **installation frame** at the installation location. The installation frame has to be assembled according to the specifications of a **project-specific dimensional sheet**.

The typical installation sequence is displayed below:

- Installation of the photoelectric reflex switch
- Installation and alignment of the deflection mirror
- Installation and alignment of the ICI890 Illumination and the ICD890 Camera
- Installation of the MSC800 Controller
- Installation of the MLG Light Grid or the VMS4xx/5xx
- Installation of the incremental encoder

Note Do not open the ICD890 Camera or the ICI890 Illumination. If the devices are opened, the manufacturer's warranty shall not apply.

4.2 Installation preparations

4.2.1 Layout the components which are to be installed

The following components of the ICR890 System have to be placed ready for installation:

- **Deflection mirror** with protective film
- **ICI890 Illumination** with protective caps
- **ICD890 Camera** with yellow and black protective caps

For further components see [Chapter 4.4 Installing external components, page 51](#).

4.2.2 Layout accessories

The following accessories are included and have to be placed ready for installation:

- 2 x 180° bracket for the deflection mirror incl.
 - 2 clamping screws for each bracket
 - 2 bolts for each bracket with 2 slot nuts for attachment to the installation frame
- 4 fastening screws for the deflection mirror
- 2 x 180° bracket for the ICI890 Illumination incl.
 - 2 clamping screws for each bracket
 - 2 bolts for each bracket with 2 slot nuts for attachment to the installation frame
- 4 fastening screws for the ICI890 Illumination

The following tools and resources are required for installation:

- Project-specific dimensional sheet
- Allen key (6 mm (0.24 in)) suitable for all screws
- Tape measure
- Goniometer

4.2.3 Selecting the installation location

Dimensional sheet

The general installation location requirements are described in [Chapter 3.2.2, page 27](#). The project-specific specifications (position of the components, distances, angles, etc.) are contained in a dimensional sheet and have to be adhered to when installing components.

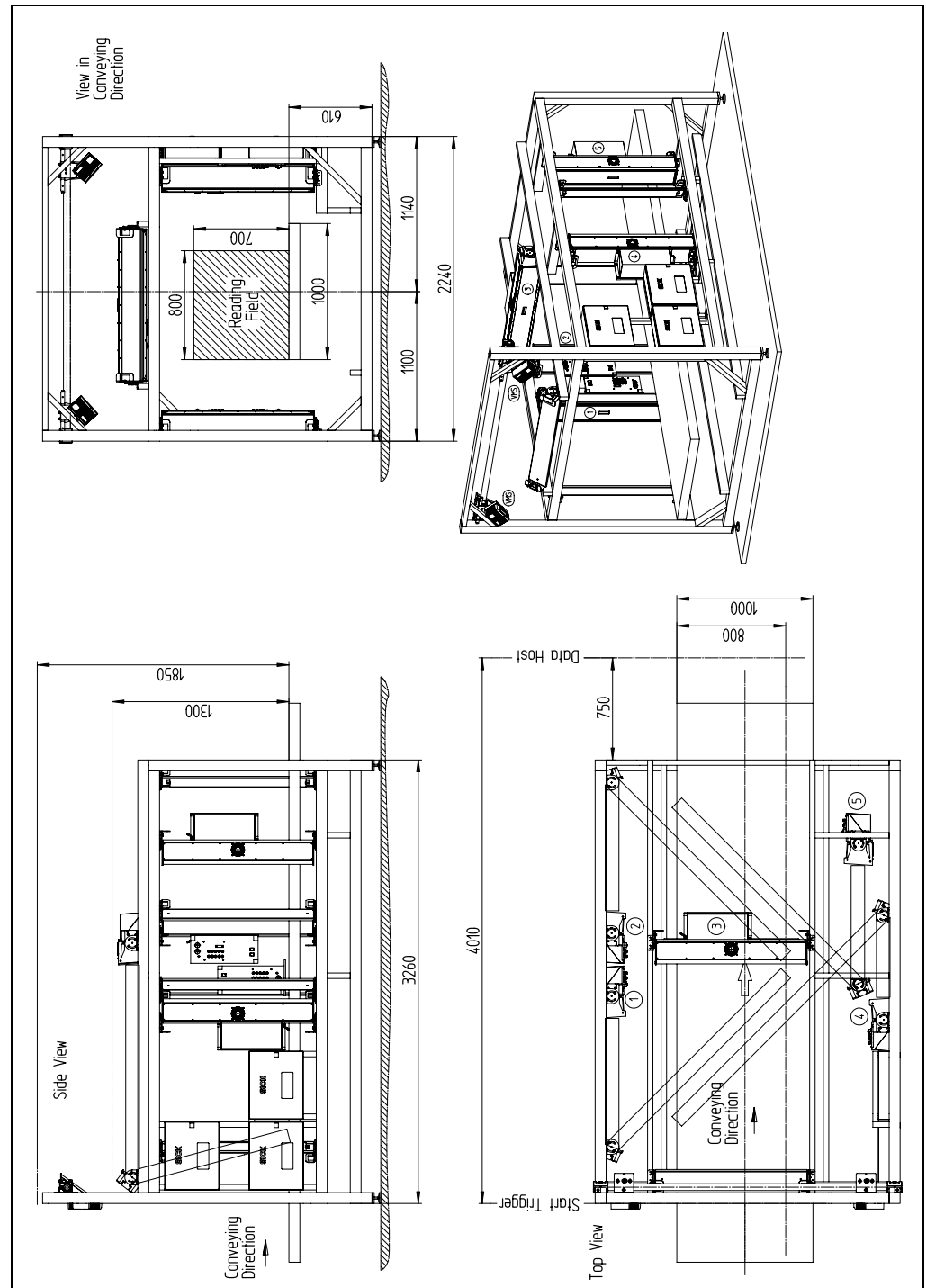


Abb. 4-1: Example of a project-specific dimensional sheet for installation

Free space required for connecting

Select an installation position for the illumination and for the camera which allows easy access to the connections.

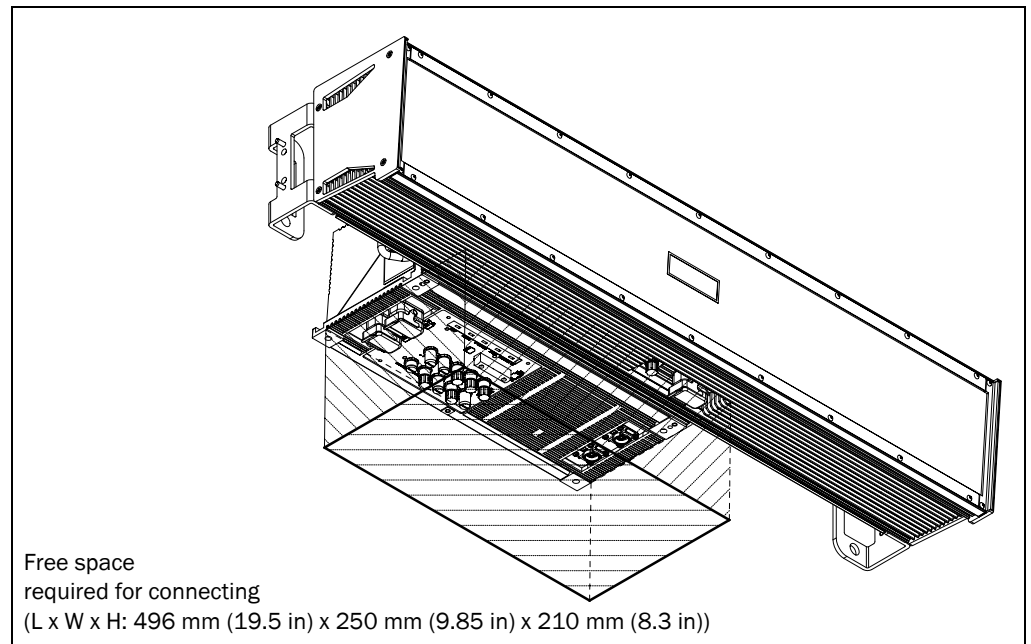


Abb. 4-2: Free space required for connecting the camera and the illumination

4.2.4 Arrangement at the conveyor system

The arrangement of the components above the conveyor system depends on the project-specific requirements and the number of systems.

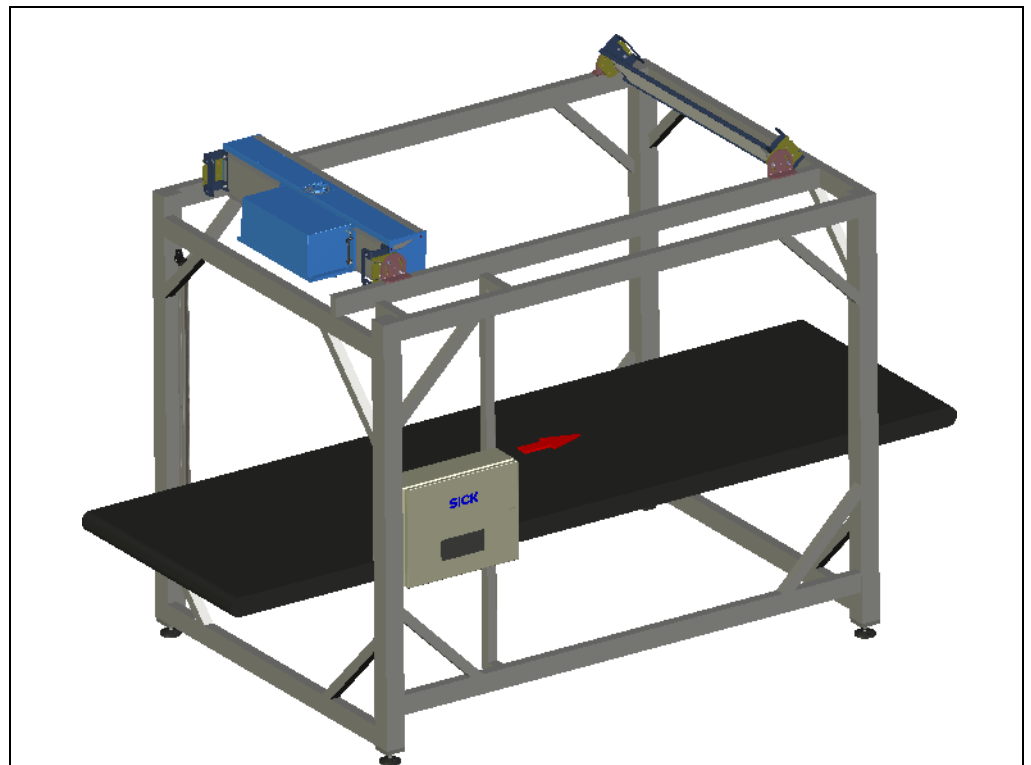


Abb. 4-3: Arrangement above the conveyor system for single-side reading from above

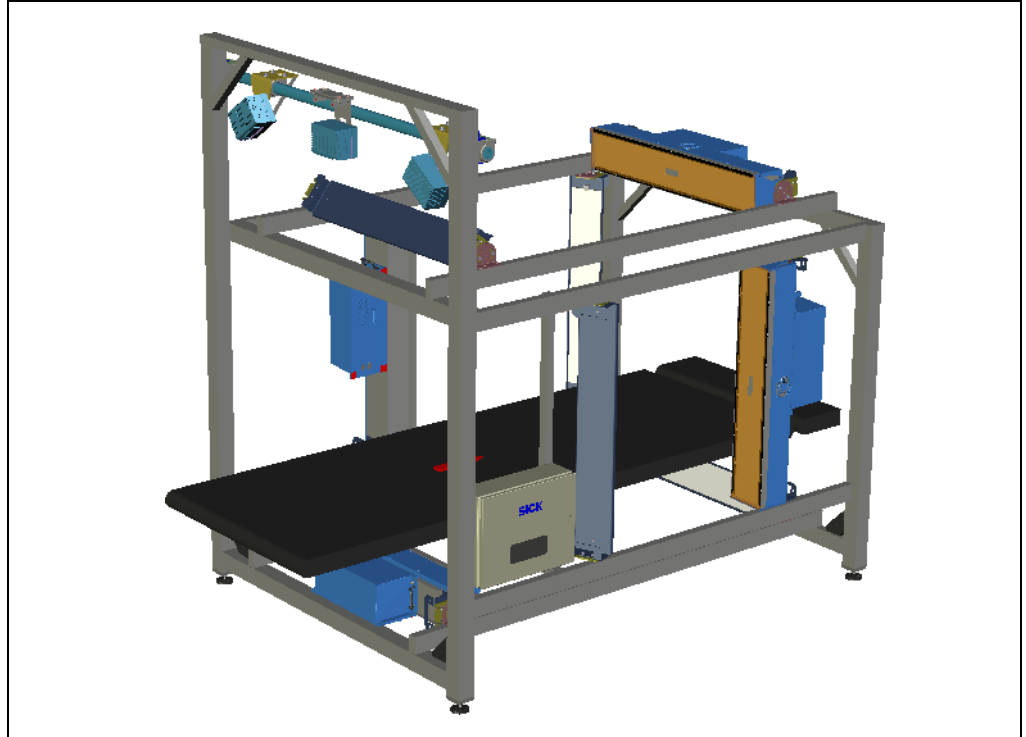


Abb. 4-4: Arrangement at the conveyor system for multi-side reading with VMS4xx/5xx

Generally, each unit consisting of an ICR890 Illumination and a ICD890 Camera is always installed together with a deflection mirror. The front of the illumination and the reflector surface have to be **exactly parallel** to each other and aligned at a right angle to the conveyor system.

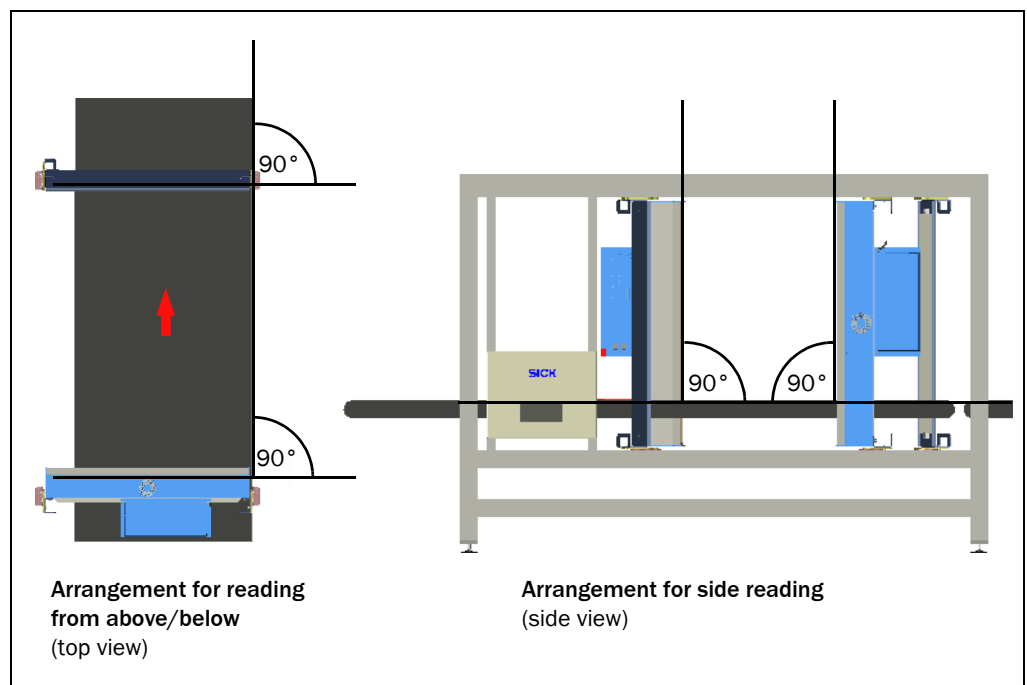


Abb. 4-5: Arrangement at the conveyor system

4.3 Installing and adjusting the device

The position of the components on the installation frame is specified project specifically in a dimensional sheet ([Fig. 4-1, page 46](#)). The specifications have to be adhered to as far as possible during installation, since the values influence the configuration of the system to some extent.

Note A final (fine) adjustment of the components can only occur during startup (see [Chapter 6.3, page 80](#)). Prerequisite for this is the complete electrical installation of the system ([Chapter 5, page 53](#)).

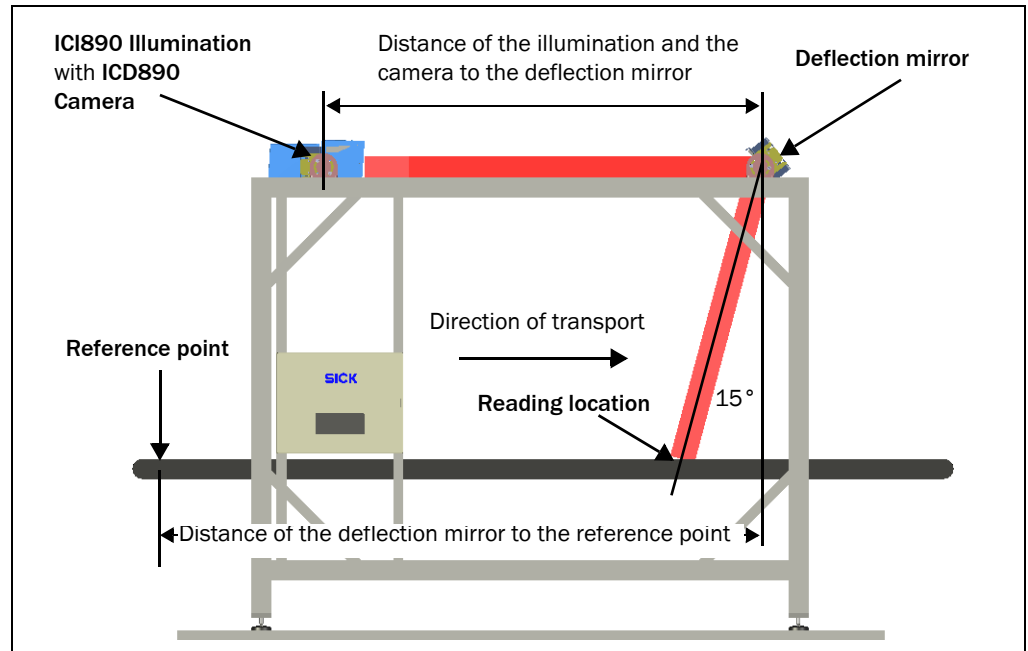


Abb. 4-6: Position of the components

In order to facilitate component alignment, the deflection mirror and the unit consisting of the illumination and the camera are attached to the installation frame via 180° brackets.

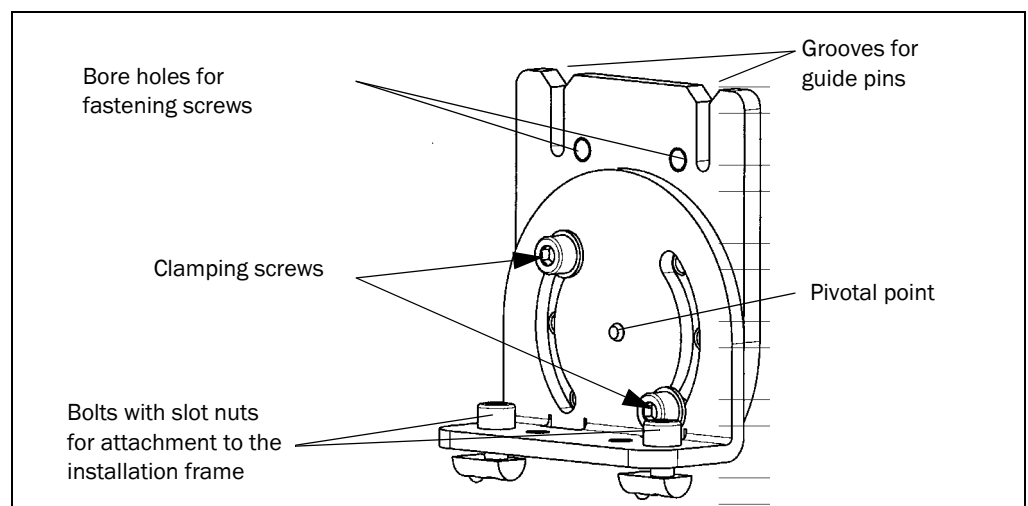


Abb. 4-7: 180° bracket for the deflection mirror and the illumination

After loosening the clamping screws, the angle of the brackets can be adjusted from 0° to 180° as required. To achieve this, the clamping screws can be screwed into the various threaded holes.

4.3.1 Installing the deflection mirror

The deflection mirror is attached to the installation frame via two 180° brackets. The position of the deflection mirror results from the distance to the reference point in the direction of transport (plumb line above the pivotal point of the bracket) and the angle to the conveyor level (see [Fig. 4-6, page 49](#)). The deflection mirror has to be installed parallel to the conveyor level.

1. Attach a 180° bracket to each side of the installation frame using two bolts and two slot nuts on each side.
2. Place the mounting plate of the 180° bracket vertically and tighten the clamping screws.
3. Insert the guide pins of the deflection mirror into the grooves of the 180° brackets. The grips point upward.
4. Use two fastening screws to attach the deflection mirror to the 180° brackets.
5. Loosen the clamping screws, use the goniometer to adjust the deflection mirror to the desired angle and retighten the clamping screws.
6. Remove the protective film from the deflection mirror.

4.3.2 Installing the ICI890 Illumination and the ICD890 Camera

The illumination is attached to the installation frame via two 180° brackets. The position of the illumination is the result of the distance to the deflection mirror (see pivotal point of the brackets, [Fig. 4-6, page 49](#)). The illumination has to be parallel to the deflection mirror.



Risk of injuries due to falling components!

The combined weight of the ICD890 Camera and the ICI890 Illumination is approx. 37 kg (81.6 lb) without installation accessories.

- Do **not** carry out installation work alone.
 - A second person should always secure components during installation.
-

1. Attach a 180° bracket to each side of the installation frame using two bolts and two slot nuts on each side.
2. Place the mounting plate of the 180° bracket vertically and tighten the clamping screws.
3. Insert the guide pins of the illumination into the grooves of the 180° brackets. Always ensure free space for connecting ([Fig. 4-2, page 47](#)).
4. Use four fastening screws to attach the illumination to the 180° brackets.
5. Remove the protective cap from the illumination and ensure that the sealing ring on the illumination is positioned correctly.

6. Remove both protective caps from the camera.

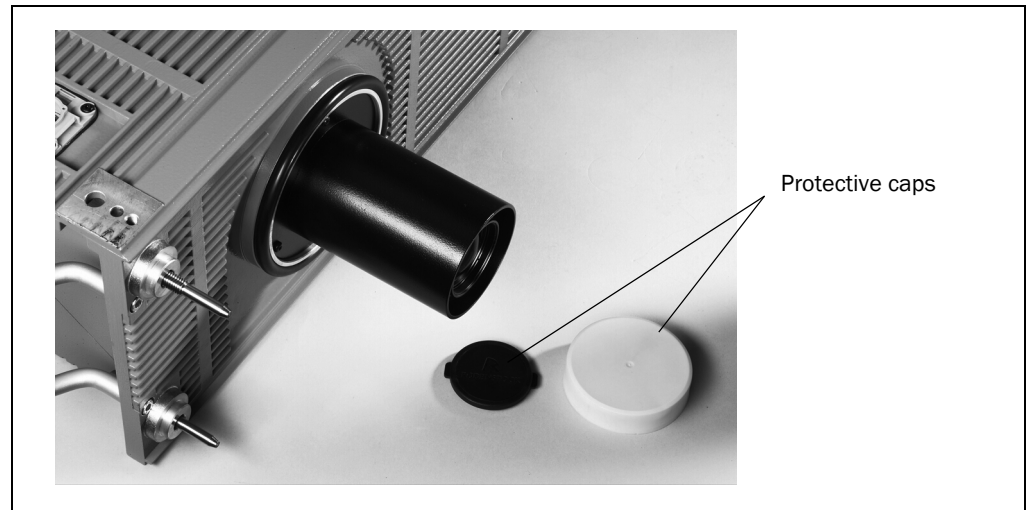


Abb. 4-8: Removeable protective camera caps

7. Place the camera on the illumination and screw it to the illumination using the four hexagon socket screws (centering pin with thread).
8. Loosen the clamping screws at the 180° brackets, horizontally rotate the illumination and retighten the clamping screws.

4.4 Installing external components

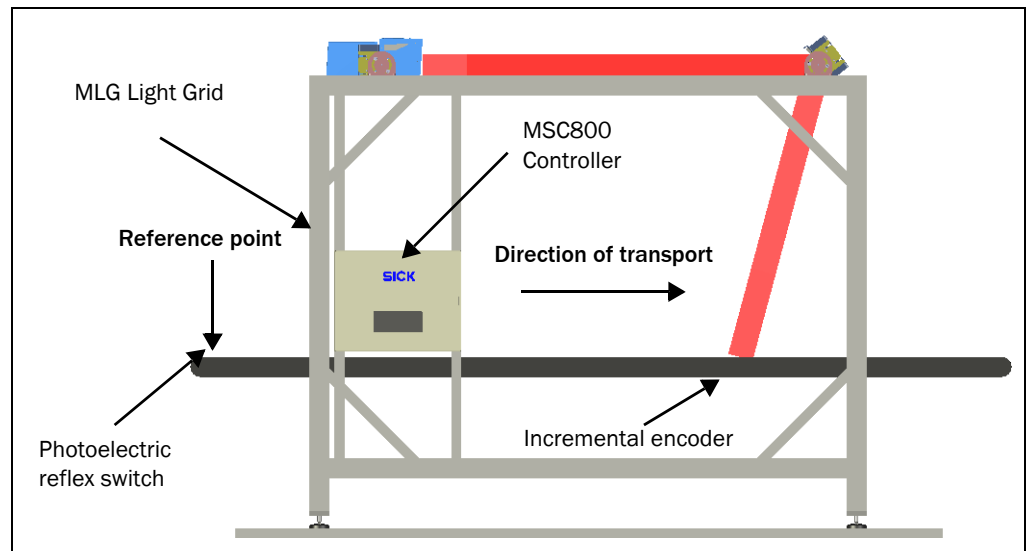


Abb. 4-9: Position of the external components

4.4.1 External sensors for triggering

The reading pulse sensor (photoelectric reflex switch) is attached to the right-hand edge of the conveyor system according to the specifications in the project-specific dimensional sheet. The position of the photoelectric reflex switch is the **reference point** for the position of the other components (see [Fig. 4-6, page 49](#)). The photoelectric reflex switch has to be aligned as vertically as possible in the direction of transport.

- Install the photoelectric reflex switch onto the conveyor system.

4.4.2 Installing the incremental encoder

The incremental encoder is attached directly to the conveyor system according to the specifications in the project-specific dimensional sheet. The position of the incremental encoder should be as close as possible to the reading location.

- Install the incremental encoder to the reading location. Ensure that the friction wheel has direct and permanent contact with the conveyor surface and does not slip.

4.4.3 Installing the MLG Light Grid

The MLG Light Grid is attached directly to the installation frame according to the specifications in the project-specific dimensional sheet. Select a position for the light grid which ensures that a large area above the conveyor level is detected by the sensors of the MLG. The lower sensors should not be permanently covered by the conveyor system.

- Install the MLG Light Grid to the installation frame.

For further information see the *MLG Modular Light Grid Operating Instructions* (no. 8009403).

4.4.4 Installing the MSC800 Controller

The MSC Controller is attached directly to the installation frame according to the specifications in the project-specific dimensional sheet. Select a position for the MSC800 which ensures that the cables to the controller are easy to lay.

- Install the MSC800 close to the reading location.

For further information see the *MSC800 Operating Instructions* (no. 8011540).

4.5 Removing the device



Risk of injuries due to falling components!

The combined weight of the ICD890 Camera and the ICI890 Illumination is approx. 37 kg (81.6 lb) without installation accessories.

- Do **not** carry out removal work alone.
 - A second person should always secure components during removal.
-

Removal of the components is described in [Chapter 7.3 Replacing a system or a component, page 93](#).

Note Prior to removing the camera, always clean the cooling ribs on the illumination and on the camera (see [Chapter 7.2.3 Cleaning the deflection mirror, page 91](#)). This prevents dirt from entering into the illumination housing.

Carry out environmentally friendly disposal after decommissioning according to [Chapter 7.4 Disposal, page 95](#).

5 Electrical installation

5.1 Overview of installation sequence

Note Complete installation of all the components is a prerequisite for electrical installation (see [Chapter 4 Installation, page 45](#)).

The following list provides an overview of a typical installation sequence:

- Connecting the power supply of the ICR890 Illumination and the illumination control line to the camera (system-internal connections)
- Connecting the ICD890 Camera to the external power supply (24 V DC)
- Connecting the host processor (RS 232, RS 422/485, Ethernet or CAN)
- Connecting the reading pulse sensor(s)
- Connecting the MLG Light Grid (RS 485) or the VMS4xx/5xx (CAN)
- Connecting the incremental encoder
- Connecting a PC/laptop temporarily for startup/configuration (RS 232 or Ethernet)
- Optional: Wiring the switching outputs for system status indication
- Optional: Connecting the special PC with 2 GBit Ethernet interfaces and software (driver) for real-time image transfer/presentation

The actual installation work which has to be carried out depends on the respective system configuration with which the ICR890 System is operated (see [Chapter 5.2 Electrical installation preparation, page 54](#)). Once electrical installation has been completed, the system is started up, adjusted and configured (see [Chapter 6.1 Overview of the startup procedure, page 79](#)).

5.2 Electrical installation preparation

The ICR890 System can be used for **single-side reading with or without the MSC800** or for **multi-side reading with the MSC800**.

These three possibilities of use are described in the following chapters, each one by means of a block diagram and a table of connections. Instructions on how to carry out the individual installation sequences are contained in [Chapter 5.4, page 64](#).

5.2.1 Electrical installation of the ICR890 System (without MSC800)

Block diagram of the ICR890 System without MSC800 for single-side reading from above

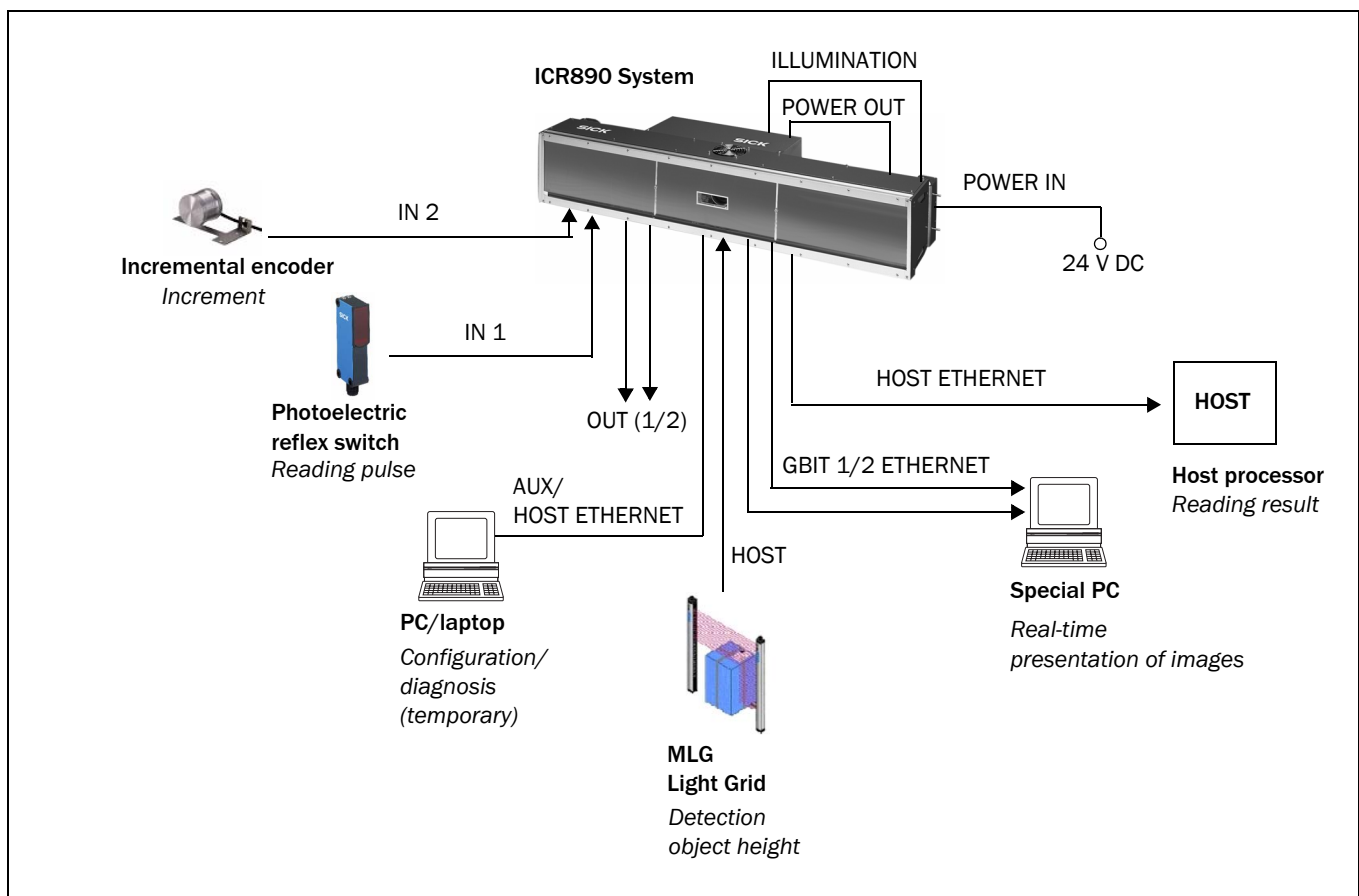


Abb. 5-1: Block diagram: connection principle of the ICR890 (standard system)

ICR890

Wiring of the ICR890 System without MSC800 for single-side reading

The following connections have to be established if **one** ICR890 is used as a stand-alone device without the MSC800 (e.g. reading from above):

No.	ICD890 Camera connection	Function	Connection to ...	Cable to be used
1	POWER OUT	Illumination power supply	POWER IN connection of the ICI890 Illumination	No. 2039397
2	ILLUMINATION	Illumination control	ILLUMINATION connection of the ICI890 Illumination	No. 6030216
3	POWER IN	Power supply 24 V DC	Power supply provided by the client	No. 2039398 (10 m (32.8 ft))
4	IN 1	Reading pulse trigger signals	External reading pulse sensor	Included in delivery
5	HOST or AUX	Detection of object height	MLG Light Grid (RS 485)	Included in delivery
6	IN 2	Increment signals	Incremental encoder (resolution 10 mm (394 mil)/incr.)	Included in delivery
7	OUT (1/2)	Indication of system status	PLC (optional)	No. 6027559 (10 m (32.8 ft))
8	HOST or HOST ETHERNET	Data output of the reading result	Host processor (RS 232, RS 422/485 or Ethernet)	- RS 232, RS 422/485: no. 6028420 (10 m (32.8 ft)) - Ethernet: patch cable: no. 6030928 (3 m (9.84 ft)) no. 6029630 (5 m (16.4 ft))
9	GBIT 1/2 ETHERNET	Real-time image transfer	Special PC for image presentation (optional)	Crossover cable no. 6029775 (10 m (32.8 ft)) or patch cable no. 6029776 (10 m (32.8 ft))
10	AUX or HOST or HOST ETHERNET	Configuration/Diagnosis	Standard PC, temporarily, (RS 232 or Ethernet)	- RS 232: no. 6028420 (10 m (32.8 ft)) no. 6028420 (10 m (32.8 ft)) - Ethernet: patch cable: no. 6030928 (3 m (9.84 ft)) no. 6029630 (5 m (16.4 ft))

Tab. 5-1: ICR890 System (stand-alone device) without MSC800: Overview of the ICD890 Camera connections which have to be established

5.2.2 Electrical installation of the ICR890 System with MSC800 (single-side reading)

Block diagram of the ICR890 System with MSC800 for single-side reading from above

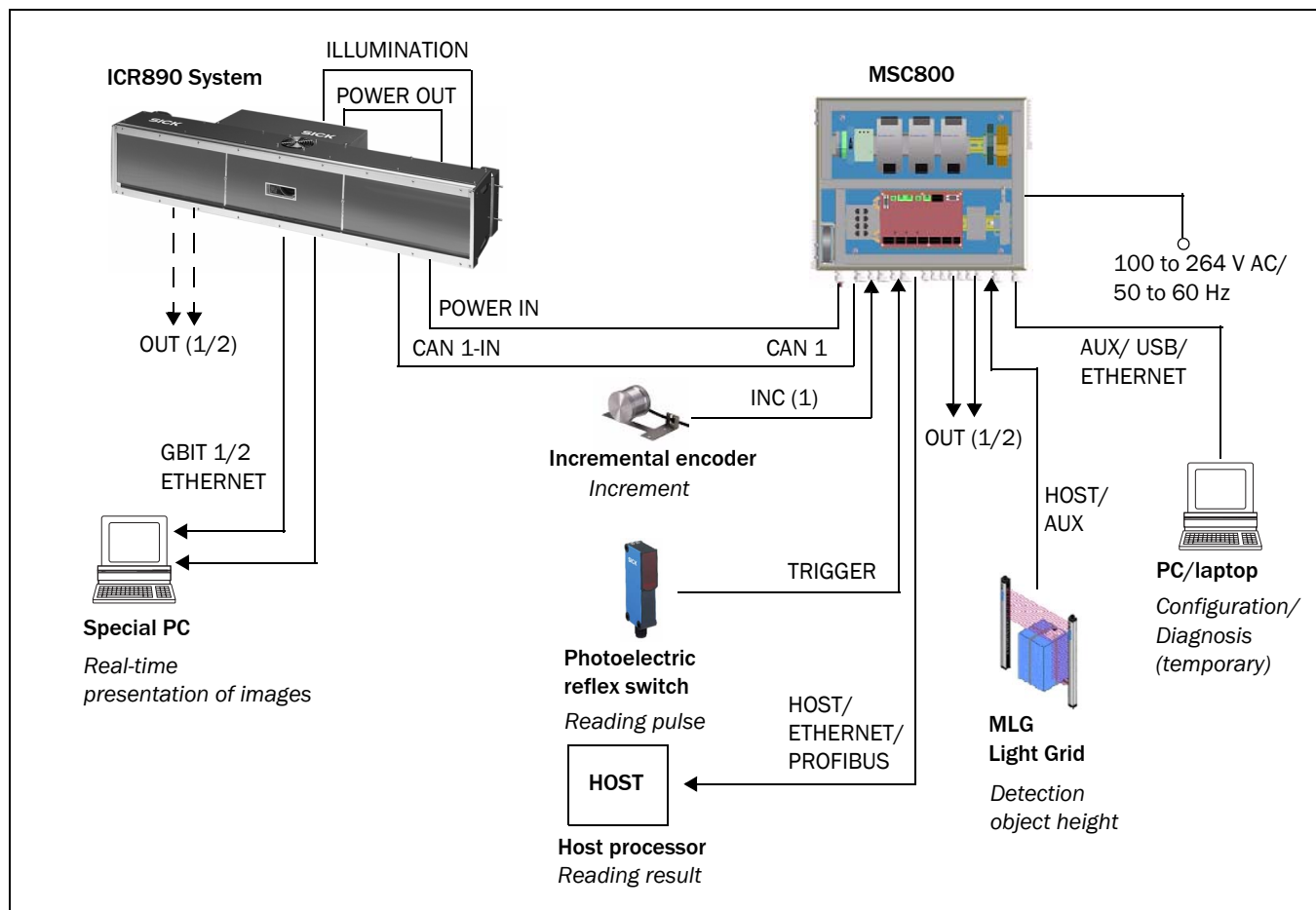


Abb. 5-2: Block diagram: Connection principle of a ICR890 (standard system) with MSC800

Wiring of the ICR890 System with MSC800 for single-side reading

The following connections have to be established if **one** ICR890 is used as a stand-alone device with the MSC800 (e.g. reading from above):

No.	ICD890 Camera connection	Function	Connection to ...	Cable to be used
1	POWER OUT	Illumination power supply	POWER IN connection of the ICI890 Illumination	No. 2039397
2	ILLUMINATION	Illumination control	ILLUMINATION connection of the ICI890 Illumination	No. 6030216
3	POWER IN	Power supply 24 V DC	Internal power supply of the MSC800	No. 2039398 (10 m (32.8 ft))
4	CAN 1-IN	Communication with MSC800 (CAN-SENSOR network)	"CAN 1" connection of the MSC800	No. 6021166 (5 m (16.4 ft)) or No. 6021175 (10 m (32.8 ft))
5	CAN 1-OUT	Terminal resistance	-	No. 6021167
6	GBIT 1/2 ETHERNET	Real-time image transfer	Special PC for image presentation (optional)	Crossover cable no. 6029775 (10 m (32.8 ft)) or patch cable no. 6029776 (10 m (32.8 ft))

Tab. 5-2: ICR890 System (stand-alone device) with MSC800: Overview of the ICD890 Camera connections which have to be established

ICR890

No.	MSC800 connection	Function	Connection to ...	Cable to be used
1	Power supply input terminals	Power supply of the MSC800	Mains voltage 100 to 264 V AC/50 to 60 Hz	Cable provided by the client
2	TRIGGER	Reading pulse trigger signals	External reading pulse sensor	Included in delivery
3	HOST or AUX	Detection of object height	MLG Light Grid (RS 485)	Included in delivery
4	INC	Increment signals	Incremental encoder (resolution 0.2 mm (7.9 mil)/incr.)	Included in delivery
5	HOST or ETHERNET or PROFIBUS	Data output of the reading result at the ICR890 System	Host processor (RS 232, RS 422/485 or Ethernet)	Cable provided by the client
6	OUT (1/2)	Indication of system status	PLC (optional)	Cable provided by the client
7	AUX or USB or ETHERNET	Configuration/Diagnosis	Standard PC, temporarily	Cable provided by the client

Tab. 5-3: ICR890 System (stand-alone device) with MSC800: Overview of the MSC800 connections which have to be established

Note Please refer to the *MSC800 Operating Instructions* (no. 8011540) for connection to the MSC800.

5.2.3 Electrical installation of the ICR890 System with MSC800 (multi-side reading)

Block diagram of the ICR890 System with MSC800 for multi-side reading

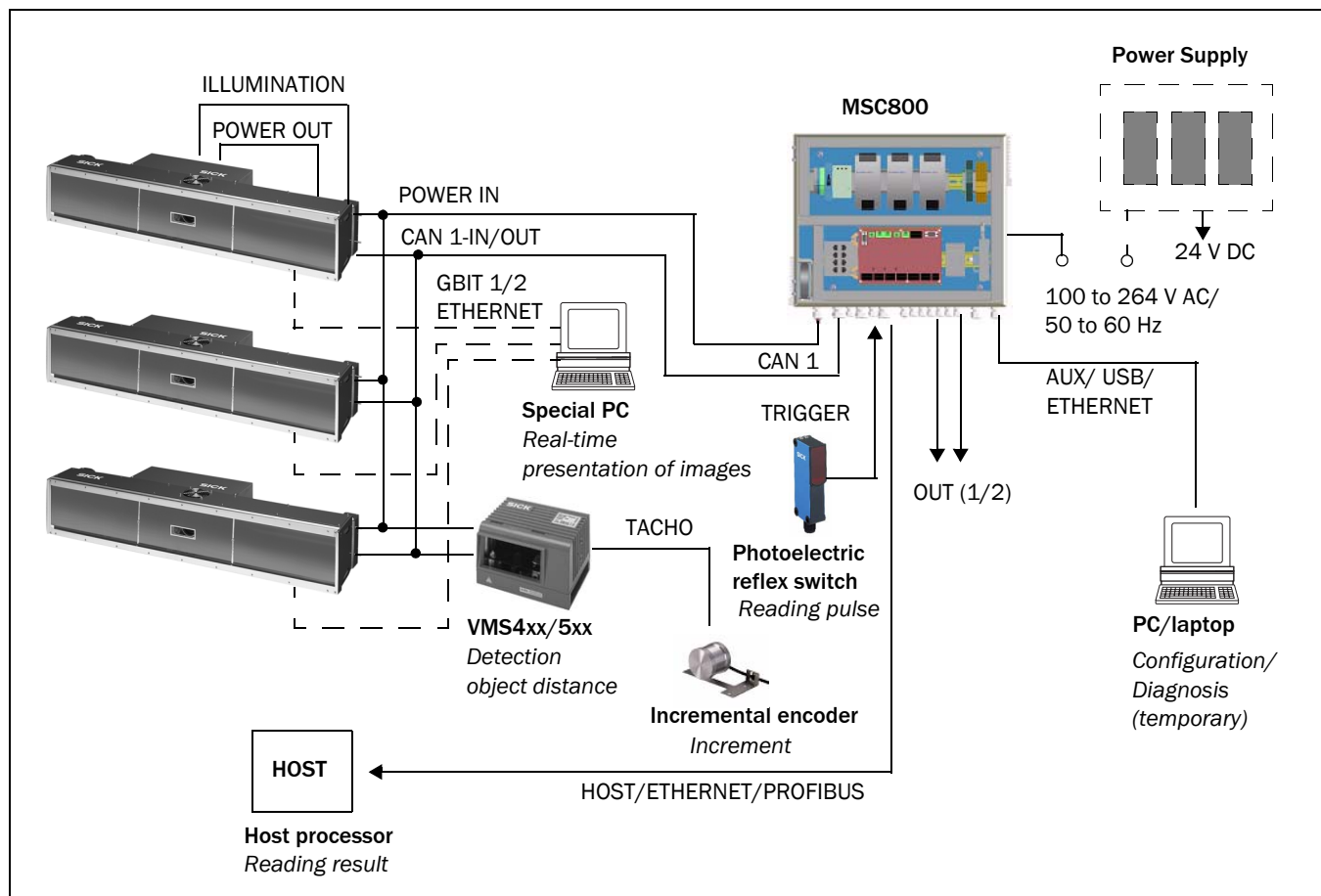


Abb. 5-3: Block diagram: Connection principle of several ICR890 (standard systems) with MSC800

Wiring of several ICR890 with MSC800 for multi-side reading.

The following connections have to be established if **several** ICR890 with MSC800 are used:

No.	ICD890 Camera connection	Function	Connection to ...	Cable to be used
1	POWER OUT	Illumination power supply	POWER IN connection of the ICR890 Illumination	No. 2039397
2	ILLUMINATION	Illumination control	ILLUMINATION connection of the ICR890 Illumination	No. 6030216
3	POWER IN	Power supply 24 V DC	Internal power supply of the MSC800	No. 2039398 (10 m (32.8 ft))
4	CAN 1-IN	Communication with MSC800 (CAN-SENSOR network)	"CAN 1" connection of the MSC800	No. 6021166 (5 m (16.4 ft)) or No. 6021175 (10 m (32.8 ft))
5	CAN 1-OUT	Communication with CAN bus (CAN-SENSOR network)	"CAN 1-IN" connection of the next ICR890 System	No. 6021164 (1 m (3.28 ft)) No. 6021165 (3 m (9.84 ft)) No. 6021168 (5 m (16.4 ft))
6	GBIT 1/2 ETHERNET	Real-time image transfer	Special PC for image presentation (optional), temporary connection to every ICR890 System, if required	Crossover cable no. 6029775 (10 m (32.8 ft)) or patch cable no. 6029776 (10 m (32.8 ft))

Tab. 5-4: ICR890 System with MSC800 (multi-side reading): Overview of the ICD890 Camera connections which have to be established

ICR890

No.	MSC800 connection	Function	Connection to ...	Cable to be used
1	Power supply input terminals	Power supply of the MSC800	Mains voltage 100 to 264 V AC/50 to 60 Hz	Cable provided by the client
2	TRIGGER	Reading pulse trigger signals	External reading pulse sensor	Included in delivery
3	HOST or ETHERNET or PROFIBUS	Data output of the reading result of all ICR890 Systems via the MSC800	Host processor (RS 232, RS 422/485 or Ethernet)	Cable provided by the client
4	OUT 1/2	Indication of system status	PLC (optional)	Cable provided by the client
5	AUX or USB or ETHERNET	Configuration/Diagnosis	Standard PC, temporarily	Cable provided by the client

Tab. 5-5: ICR890 System with MSC800 (multi-side reading): Overview of the MSC800 connections which have to be established

Note Please refer to the *MSC800 Operating Instructions* (no. 8011540) for connection to the MSC800.

No.	VMS4xx/5xx connector cap connection	Function	Connection to ...	Cable to be used
1	Power/CAN IN	Communication with CAN bus (CAN-SENSOR network)	"CAN 1-IN" connection of the next ICR890 System	No. 6021164 (1 m (3.28 in)) No. 6021165 (3 m (9.84 ft)) No. 6021168 (5 m (16.4 ft))
4	Tacho	Increment signals	Incremental encoder (resolution 0.2 mm (7.9 mil)/incr.)	Included in delivery

Tab. 5-6: ICR890 System with MSC800 (multi-side reading): Overview of the VMS4xx/5xx connections which have to be established

Note Please refer to the *VMS410 Volume Measurement System Operating Instructions* (no. 8010592) for connection to the VMS410 or to the *VMS 420/520 Volume Measurement System Operating Instructions* (no. 8010448) for connection to the VMS420/520 as well as to the connector cap installation instructions for the *VMS400/500 Volume Measurement Systems* (no. 8010817).

5.3 Electrical connections and cables



Prerequisites for enclosure rating IP 64

All the electrical connections of the camera and illumination have been provided with appropriate protective caps for delivery.

To maintain the enclosure rating IP 64, **unused** connections have to be provided with protective caps during operation. The connectors attached to used connections have to be **firmly** screwed or engaged.

The same applies to the EMC requirements (ESD) according to CE.

The protective caps have the following colours:

- M12 connectors: yellow (plugs) and black (sockets)
- RJ-45 connections: Grey, fixed to the device via a strap (cannot be lost)
- Power supply: black



RF interference in case of use in residential areas.

- ICR890 High-end CCD Camera System is exclusively intended for use in an industrial environment.

5.3.1 Electrical connections of the ICD890 Camera

The electrical connections of the ICR890 System comprise eleven M12 connectors attached to the housing of the **ICD890 Camera** (on and next to the panel), two Harting connectors for the power supply as well as two RJ-45 connections (enclosure rating IP 67) for the GBit Ethernet.

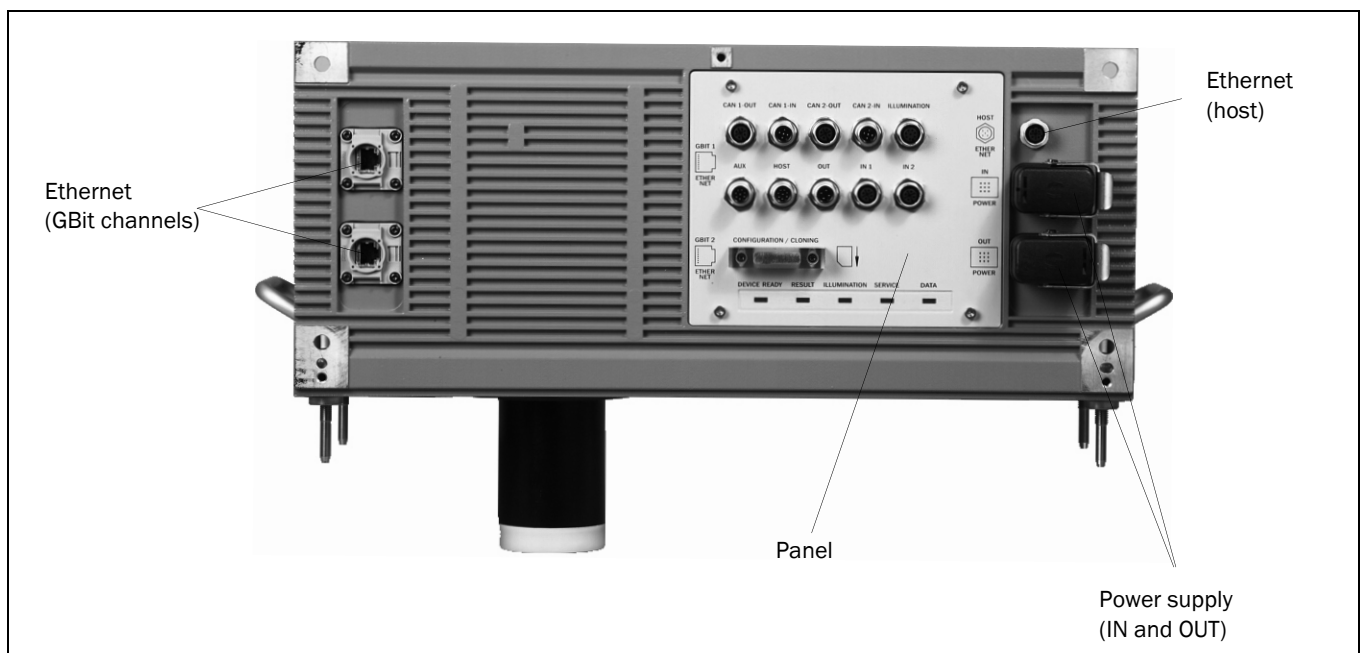


Abb. 5-4: ICD890 Camera: Position of the electrical connections (standard system)

The following interfaces are realized via the ICD890 Camera connections:

Connection	Design	Number of poles	Function
GBIT 1 ETHERNET	RJ-45	8, socket	Image data output, channel 1
GBIT 2 ETHERNET	RJ-45	8, socket	Image data output, channel 2
CAN 1-OUT	M-12	5, socket	Output CAN-SENSOR network 1
CAN 1-IN	M-12	5, plug	Input CAN-SENSOR network 1
CAN 2-OUT	M-12	5, socket	Output CAN-SENSOR network 2 (reserved)
CAN 2-IN	M-12	5, plug	Input CAN-SENSOR network 2 (reserved)
ILLUMINATION	M-12	8, socket	Control data interface ICI890 Illumination
AUX	M-12	8, plug	Auxiliary data interface (RS 232, RS 422/485)
HOST	M-12	8, plug	Main data interface (RS 232, RS 422/485)
OUT	M-12	4, plug	Two digital switching outputs (system status)
IN 1	M-12	5, socket	Digital switching input (reading pulse)
IN 2	M-12	5, socket	Digital switching input (reading pulse, increment)
HOST ETHERNET	M-12	5, socket	Main data interface (10/100 MBps)
POWER IN	Harting HanQ8	8, plug	Power supply input 24 V DC
POWER OUT	Harting HanQ8	8, socket	Output 24 V DC, to ICI890 Illumination

Tab. 5-7: ICD890 Camera: Function of the electrical connections

5.3.2 Electrical connections of the ICI890 Illumination

The ICI890 Illumination is equipped with a Harting connector for the **power supply** and an M12 connector for the **control line**.

The following interfaces are realized via the ICI890 Illumination connections:

Design	Number of poles	Function
M-12	8, plug	Control data interface ICD890 Camera
Harting HanQ8	8, plug	Power supply input 24 V DC

Tab. 5-8: ICI890 Illumination: Function of the electrical connections

5.3.3 Electrical connections of the MSC800 (overview)

Please refer to the *MSC800 Operating Instructions* (no. 8011540) for connections of the MSC800-0000 logic controller.

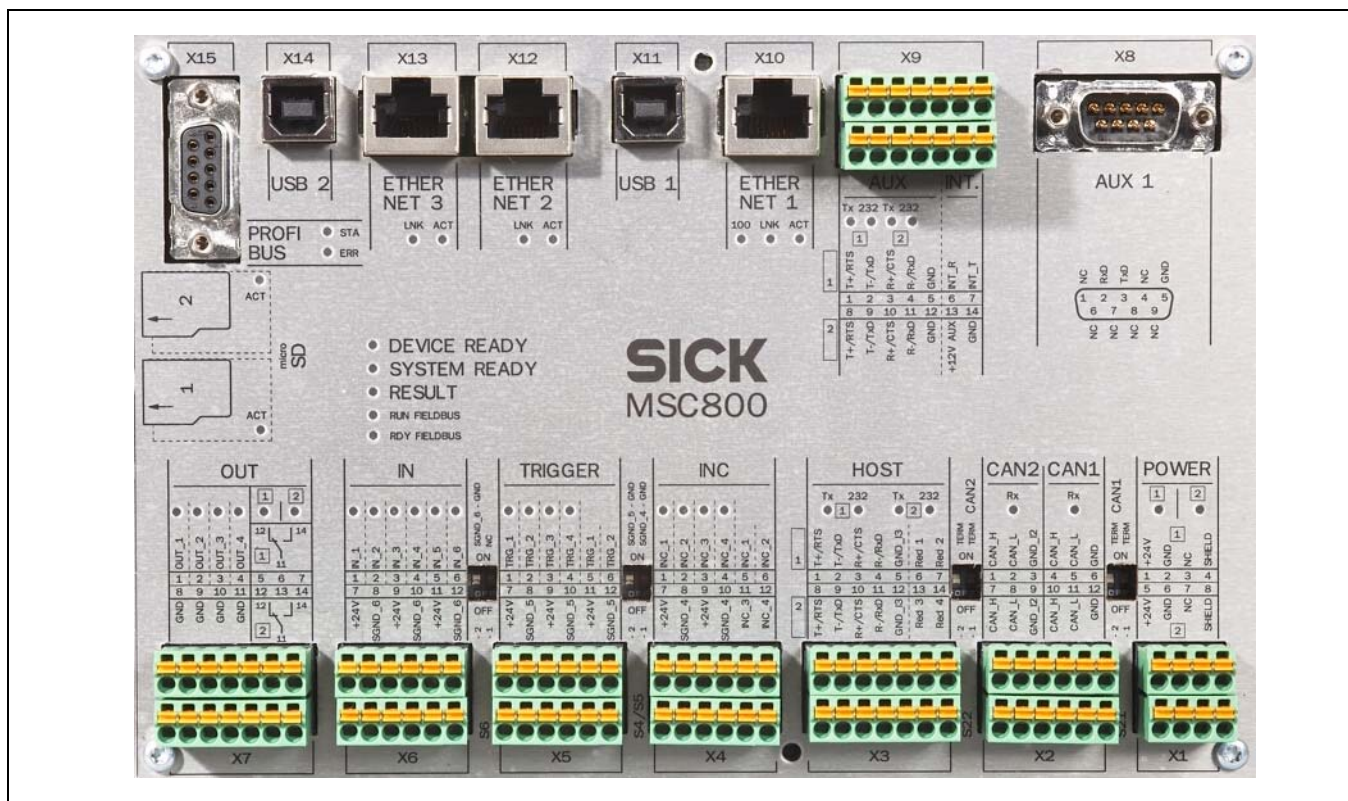


Abb. 5-5: MSC800-0000 logic controller: Position of the electrical connections

The following interfaces are realized via the MSC800-0000 connections:

Connection	Design	Number of poles	Function
PROFIBUS	D-Sub	9, socket	Main data interface
USB 2	USB	4	Auxiliary data interface
ETHERNET 3	RJ-45	8, socket	Auxiliary data interface
ETHERNET 2	RJ-45	8, socket	Auxiliary data interface
USB 1	USB	4	Auxiliary data interface
ETHERNET 1	RJ-45	8, plug	Main data interface
AUX 2	Block	14, terminals	Auxiliary data interface (RS 232, RS 422/485)
AUX 1	D-Sub	9, plug	Auxiliary data interface (RS 232, RS 422/485)
OUT	Block	14, terminals	Digital switching outputs (system status)
IN	Block	12, terminals	Digital switching inputs
TRIGGER	Block	12, terminals	Digital switching inputs (reading pulse)
INC	Block	12, terminals	Digital incremental encoder inputs
HOST (1/2)	Block	14, terminals	Main data interface (RS 232, RS 422/485)
CAN 2	Block	12, terminals	Input/Output CAN-SENSOR network 2
CAN 1	Block	12, terminals	Input/Output CAN-SENSOR network 1
POWER	Block	8, terminals	Power supply input 24 V DC

Tab. 5-9: MSC800-0000 logic controller: Function of the electrical connections (overview)

5.3.4 Assembled cables (overview)

Interface from ICD890 Camera to	Cable no.	Type	Length	Cable ends		Enclosure rating
				ICD890	external	
HOST/AUX (RS 232, RS 422/485)	6028420	Connection cable for host processor or PC, TPU/PUR bundle jacket	10 m (32.8 ft)	8-pole M12 socket	open	IP 65
CAN-SENSOR network	6021164	CAN data cable, PVC-free	1 m (3.28 ft)	5-pole M12 socket	5-pole M12 plug	IP 65
CAN-SENSOR network	6021165	CAN data cable, PVC-free	3 m (9.84 ft)	5-pole M12 socket	5-pole M12 plug	IP 65
CAN-SENSOR network	6021168	CAN data cable, PVC-free	5 m (16.4 ft)	5-pole M12 socket	5-pole M12 plug	IP 65
CAN-SENSOR network	6021166	CAN data cable to MSC800, PVC-free	5 m (16.4 ft)	5-pole M12 socket	open	IP 65
CAN-SENSOR network	6021175	CAN data cable to MSC800, PVC-free	10 m (32.8 ft)	5-pole M12 socket	open	IP 65
CAN-SENSOR network	6021167	CAN terminal resistance	–	5-pole M12 plug	–	IP 65
Ethernet	6029776	Patch cable for GBit Ethernet, CAT6, PVC-free	10 m (32.8 ft)	RJ-45 plug	RJ-45 plug	IP 65/20
Ethernet	6029775	Crossover cable for GBit Ethernet, CAT6, PVC-free	10 m (32.8 ft)	RJ-45 plug	RJ-45 plug	IP 65/20
HOST Ethernet	6030928	Patch cable for HOST Ethernet, (10/100 MBps), CAT5	3 m (9.84 ft)	4-pole M12 plug	RJ-45 plug	IP 65/20
HOST Ethernet	6029630	Patch cable for HOST Ethernet, (10/100 MBps), CAT5	10 m (32.8 ft)	4-pole M12 plug	RJ-45 plug	IP 65/20
Reading pulse sensor Incremental encoder	6024861	Connection cable for switching inputs, PUR bundle jacket	5 m (16.4 ft)	5-pole M12 plug	open	IP 65
PLC	6027559	Connection cable for switching outputs	10 m (32.8 ft)	4-pole M12 socket	open	IP 65
ICI890 Illumination	6030216	Illumination control line (included in delivery), PUR, halogen-free	0.6 m (23.6 in)	8-pole M12 plug	8-pole M12 socket	IP 65
ICI890 Illumination	2039397	Illumination power supply (included in delivery)	0.75 m (29.6 in)	8-pole Harting HanQ plug	8-pole Harting HanQ socket	IP 65
Power supply	2039398	Connection cable for power supply	10 m (32.8 ft)	8-pole Harting HanQ socket	open	IP 65
ICI890 Illumination	2032922	Illumination power supply, PVC-free	0.75 m (29.6 in)	8-pole Harting HanQ plug	8-pole Harting HanQ socket	IP 65
Power supply	2032926	Connection cable for power supply, PVC-free	10 m (32.8 ft)	8-pole Harting HanQ socket	open	IP 65

Tab. 5-10: Cables for connecting the ICR890 System

All the cables included on the list are suitable for the temperature range 0 to +40 °C (32 to 104 °F).

See [Chapter 10.4.3 Accessories: Cables and connectors, page 115](#) for technical cable data. See [Chapter 5.5.3 Wire colours assignment of assembled cables with open end, page 75](#) for the wire colour assignment of cables with open cable end.

5.4 Performing electrical installation



Risk of injuries due to electrical current!

The MSC800 Controller is connected to the power supply (mains voltage 100 to 264 V AC/ 50 to 60 Hz).

- Observe current safety regulations when working with electrical equipment.
- Make sure the equipment **has been deenergized** before performing any installation work.

Note To ensure secure fastening of the plugged connectors and adherence to the enclosure rating IP 64 for the ICR890 System, the knurled nuts/coupling rings of the M12 connectors have to be tightened and the Harting connectors for the power supply secured by means of the fastening bows.

- Wire all connections provided by the client using **shielded** copper wires!
- Pay attention to the required wire cross sections:
 - Switching inputs/outputs: At least 0.25 mm² (24 AWG)
 - Data interfaces: At least 0.22 mm² (24 AWG)
- Lay all the cables in such a manner that persons cannot trip over them and that the cables are protected against damage.

Recommendation Attach suitable wire end ferrules to the open wire ends of flexible cables which are fixed to terminal screws. However, do **not** use wire end ferrules when fixing open wire ends to **spring terminals**, since secure contact is otherwise not ensured.

5.4.1 Connecting the power supply cable and the ICI890 Illumination control line

The system-internal connection between the ICD890 Camera and the ICI890 Illumination is realized via two short cables (no. 2039397 and no. 6030216) included in the delivery.

- Plug the power supply cable no. 2039397 into the 8-pole Harting HanQ8 socket POWER OUT of the ICD890 Camera and fix it.
Plug the other cable end onto the corresponding 8-pole Harting HanQ8 plug of the ICI890 Illumination and fix it.
- Plug the control line no. 6030216 into the 8-pole M12 socket ILLUMINATION of the ICD890 Camera and fix it.
Plug the other cable end onto the corresponding 8-pole M12 plug of the ICI890 Illumination and fix it.

5.4.2 Power supply of the ICR890 System

Power supply requirements

A supply voltage of 24 V DC $\pm$ 10 % is required for the operation of the ICR890 System (functional extra-low voltage according to standard IEC 364-4-41 (VDE 0100 (Part 410))). This voltage is generated by the power supply in the MSC800 as standard. The typical power consumption per ICD890 Camera and ICI890 Illumination amounts to a total of 425 W.

Note The wire cross section for the power supply of the ICR890 System has to be at least 3 mm² (12 AWG). To ensure protection against short circuit/overload of the supply line, the cable has to be protected according to the wire cross sections used. The valid standards must be observed.

Connecting the power supply of the ICR890 System via the MSC800

1. Ensure that the external power supply for the MSC800 has been switched off.
2. Plug the 8-pole Harting HanQ8 socket of the power supply cable no. 2032926 into the 8-pole Harting HanQ8 plug POWER IN of the ICD890 Camera and fix it.
3. Attach the open cable end to the terminal strip for power supply in the MSC800. (See [Tab. 5-35, page 77](#) for pin/wire colour assignment of cable no. 2032926.)

Note The supply voltage remains **switched off** during the subsequent installation work!

5.4.3 Data interfaces HOST/AUX

General conditions of the data interfaces HOST and AUX

Both the HOST data interface (main data interface) as well as the AUX data interface (auxiliary data interface) of the ICR890 System can be operated as RS 232 version or as RS 422/485 version or be rerouted to the Ethernet interface. [Tab. 5-11](#) shows the recommended maximum cablelengths, depending on the interface version and the data transfer rate.

Interface type	Data transfer rate	Distance to target processor (host)
RS 232	up to 19.2 kbd 38.4 to 115.2 kbd	max. 10 m (32.8 ft) max. 3 m (9.84 ft)
RS 422 ¹⁾	max. 38.4 kbd max. 57.6 kbd max. 115.2 kbd	max. 1,200 m (3,936 ft) max. 500 m (1,640 ft) max. 10 m (32.8 ft)
Ethernet	10/100 MBps	max. 100 m (328 ft)
Gbit Ethernet	10 Mps to 1GBps	max. 100 m (328 ft)
1) with corresponding line termination according to specification		

Tab. 5-11: Maximum cable lengths between ICR890 and the host

- Recommendation**
- Use shielded data cables (twisted pair).
 - To prevent interference, do not lay data cables parallel to power supply cables and motor lines over a longer distance, e. g. in cable channels.

Wiring the HOST/AUX data interface



Damage to the interface modules!

Incorrect wiring of the HOST/AUX data interfaces can damage electronic components in the ICR890 System.

- Wire the data interfaces correctly according to [Fig. 5-6, page 66](#).
- Check the wiring carefully before switching on the ICR890 System.
- Connect the data interfaces to the host/PC paying attention to the EMC and using a shielded cable. Adhere to the maximum cable lengths ([Tab. 5-11, page 65](#)).
- Wire the versions RS 232 or RS 422 according to [Fig. 5-6, page 66](#).
Use cable no. 6028420 for each of the connections.
(See [Tab. 5-31, page 75](#) for pin/wire colour assignment.)

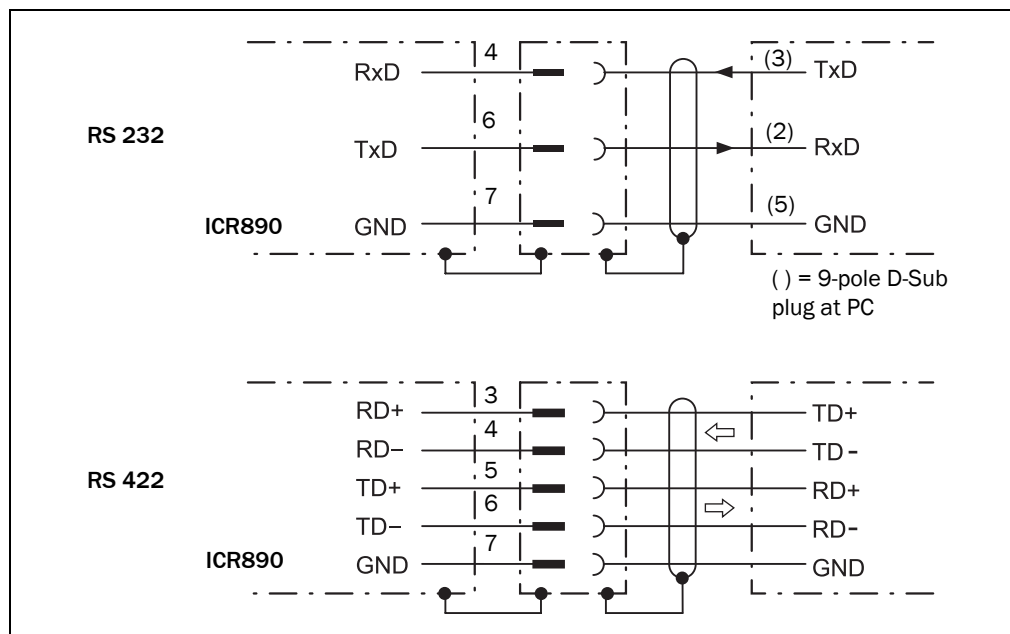


Abb. 5-6: ICD890 Camera: Wiring of the HOST/AUX data interfaces

5.4.4 Data interface CAN 1-IN/OUT

General conditions of the CAN interface

The SICK-specific CAN-SENSOR network is based on the CAN bus, which is structured in line topology.

Tab. 5-12 shows the maximum permissible CAN bus length, depending on the selected data transfer rate.

Data transfer rate	Maximum data cable length
10 kBps	4,976 m (16,325 ft)
20 kBps	2,476 m (8,123.3 ft)
50 kBps	976 m (3,202 ft)
100 kBps	576 m (1,889.7 ft)
125 kBps	476 m (1,561.7 ft)
250 kBps ¹⁾	226 m (741.5 ft)
500 kBps	76 m (249.3 ft)

1) Default setting in the ICR890 System

Tab. 5-12: CAN bus: Maximum cable lengths, depending on the data transfer rate

Tab. 5-13 shows the maximum permissible overall length of all stub cables, depending on the data transfer rate. This overall length must not be exceeded. The maximum length of each individual stub cable must not exceed 6 m (19.7 ft).

Data transfer rate	Total of all stub cable lengths
125 kBps	156 m (512 ft)
250 kBps	78 m (256 ft)
500 kBps	39 m (128 ft)

Tab. 5-13: CAN bus: Maximum stub cable lengths, depending on the data transfer rate

The required wire cross section of the data cable depends on the overall length of the network. [Tab. 5-14](#) shows an overview according to ISO 11898.

Cable length	Required wire cross section (data cable)
0 to 40 m (0 to 131 ft)	$\geq 0.25 \text{ mm}^2$ (24 AWG)
40 to 300 m (131 to 984 ft)	$\geq 0.34 \text{ mm}^2$ (22 AWG)
300 to 600 m (984 to 1968 ft)	$\geq 0.5 \text{ mm}^2$ (21 AWG)
600 to 1,000 m (1968 to 3280 ft)	$\geq 0.75 \text{ mm}^2$ (20 AWG)

Tab. 5-14: CAN bus: Required wire cross section, depending on the data cable length

Wiring the data interface CAN 1-IN/OUT

The CAN interface of the ICR890 System is used in the following configurations:

- In the case of single-side reading, the peripheral equipment should be wired centrally at the MSC800.
- In the case of multi-side reading, the ICR890 System works with the MSC800 together with further camera systems, bar code scanners and volume measurement systems (camera control).
- Connect the ICD890 Camera to the 5-pole M12 socket and the open end via the CAN 1-IN connection using the cable no. 6021166. (See [Tab. 5-32, page 76](#) for pin/wire colour assignment.)
- Attach the open cable end to the CAN 1 connection in the MSC800.
- Attach the terminal resistance no. 6021167 to the CAN1-OUT connection of the ICD890 Camera.

The signals for the reading pulse and increment are transmitted to the ICR890 System via the CAN bus. Direct connection to the ICR890 System is, thus, not required. The HOST and AUX data interfaces as well as the signals of both switching outputs (for single-side reading) are accessible via the CAN bus at the MSC800. The ICR890 System and the MSC800 have to be configured accordingly as Slave or Master for this purpose (see [Chapter 6.3 First startup, page 80](#)).

5.4.5 Wiring the Ethernet interface HOST ETHERNET

The Ethernet interface HOST ETHERNET of the ICR890 System has several functions:

- Output of the reading result of the HOST data interface via TCP/IP as an alternative to the serial interface version RS 232, RS 422/485
- Output of data of the AUX data interface (reading result + reading diagnosis data) via TCP/IP as an alternative to the serial interface version RS 232, RS 422/485
- Access to the ICR890 System via the SOPAS-ET Configuration Software
- Connection as RDT400 Client (system distance monitoring)

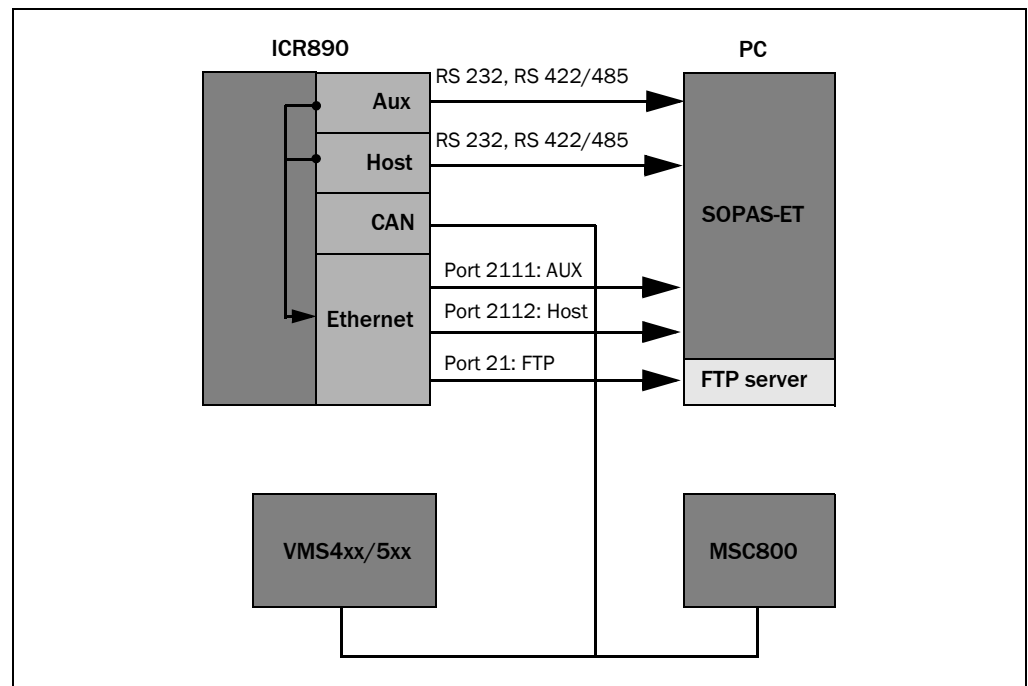


Abb. 5-7: Block diagram: Function of the Ethernet interface

Connecting the ETHERNET HOST interface

- Connect the ICD890 Camera directly to the Ethernet card of the PC (point-to-point connection) using the crossover cable (see [Tab. 10-4, page 115](#)).
- or -
- Connect the ICD890 Camera to the Ethernet network using the standardized data cable (patch cable) no. 6029630.

See [Chapter 6.3.2, page 81](#) for required settings at the PC and the ICR890 System.

5.4.6 Wiring the Ethernet interfaces GBIT 1 and GBIT 2

The two GBit Ethernet interfaces facilitate fast output of images to a special PC which is also equipped with two GBit Ethernet interfaces.

Connecting the GBIT 1-ETHERNET and GBIT 2-ETHERNET interfaces

- Connect the ICD890 Camera directly to the Ethernet card of the PC (point-to-point connection) using the crossover cables no. 6029775 (see [Tab. 5-10, page 63](#)).
- or -
- Connect the ICD890 Camera to the GBit Ethernet network using the standardized data cables (patch cables) no. 6029776.

5.4.7 Wiring the switching inputs IN 1 and IN 2

The **reading pulse sensor** is connected via the digital switching input **IN 1**.

The **incremental encoder** is connected via the switching input **IN 2**. [Fig. 5-8](#) shows the wiring of switching input IN 1 as an example. [Tab. 5-15](#) contains ratings for both inputs.

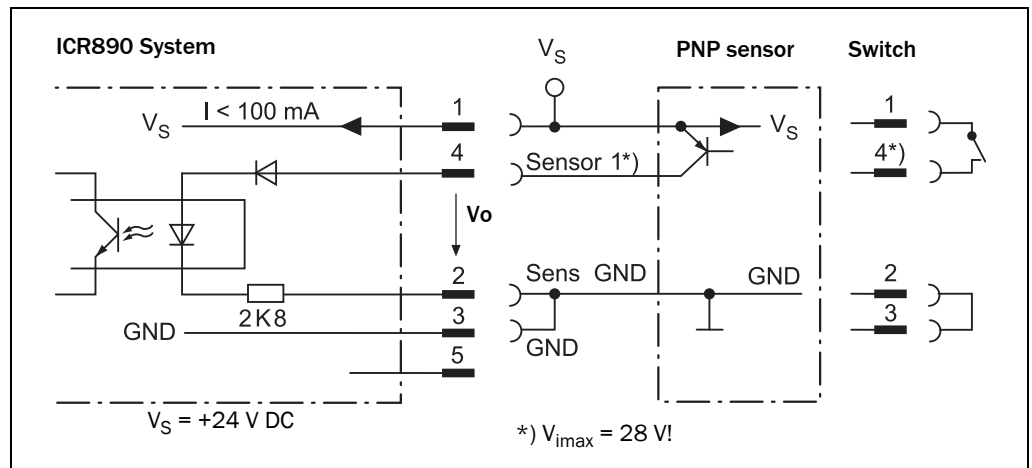


Abb. 5-8: Wiring of the switching inputs IN 1 and IN 2

Switching behaviour	IN 1: Power fed to the input opens the reading gate of the ICD890 Camera. (Default setting: Not inverted (active high); debouncing: 10 ms; pulse start delay: 0 ms, pulse end: 0 ms)	
Features	- Optodecoupled, reverse polarity protected - Can be wired with the PNP output of a sensor	
Electrical values	Low: $-1\text{ V} \leq V_i \leq +1\text{ V}$ $-0.3\text{ mA} \leq I_i \leq +0.3\text{ mA}$	High: $+8\text{ V} \leq V_i \leq +28\text{ V}$ $+1.4\text{ mA} \leq I_i \leq +18\text{ mA}$

Tab. 5-15: Ratings of the switching inputs IN1 and IN 2

Connecting the switching inputs IN 1 and IN 2

1. Connect the reading pulse sensor (photoelectric reflex switch) to switching input IN 1, as shown in [Fig. 5-8](#).
2. Connect the incremental encoder to switching input IN 2, as shown in [Fig. 5-8](#).
3. For power supply via the ICD890 Camera, additionally establish connections between SGND and GND in the connector of the connection cable.

5.4.8 Wiring the switching outputs Result 1 and Result 2 (OUT connection)

An appropriate visualization PC or PLC for system status indication is connected via these two digital switching outputs. [Fig. 5-9](#) shows the wiring of switching output Result 1 as an example. [Tab. 5-16](#) contains ratings for both outputs.

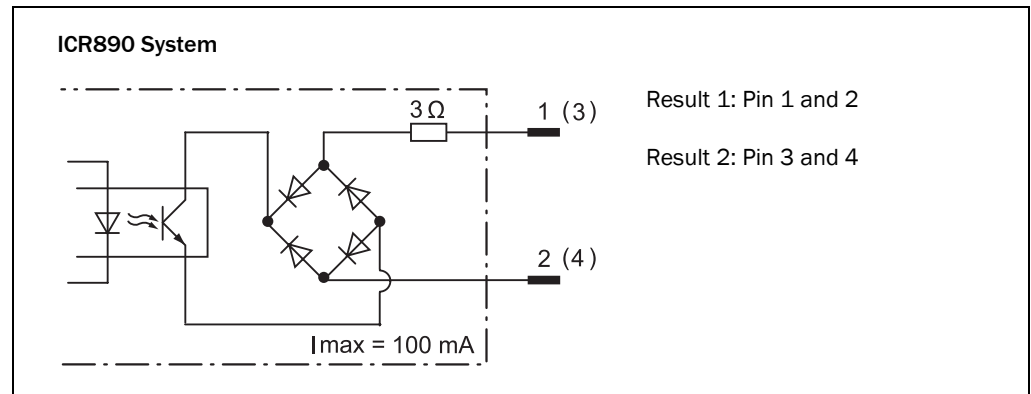


Abb. 5-9: Wiring of the switching outputs Result 1 and Result 2

Switching behaviour	PNP-switching against the supply voltage V_S
Features	– Optodecoupled, reverse polarity protected – In the event of a short circuit, the current is limited to 0.7 A – The polarity is irrelevant due to a bridge connection
Electrical values	$0 \text{ V} \leq V_o \leq 30 \text{ V}$ guaranteed: $V_o \leq V_S - 1.3 \text{ V}$ at $I_o \leq 100 \text{ mA}$ $I_o \leq 100 \text{ mA}$

Tab. 5-16: Ratings of the switching outputs Result 1 and Result 2

Connecting the switching outputs Result 1 and Result 2

- Connect the visualization PC/PLC to switching output Result 1 and/or Result 2, as shown as an example in [Fig. 5-9](#).

Note In the "Device Ready" function, the output supplies a static pulse if the ICR890 System is in reading operation.

- Recommendation**
- Wire the outputs with a load resistance to test the switching functions using a high-resistance digital voltmeter. Indication of incorrect voltages/switching statuses is avoided this way.

5.5 Pin assignments and conductor colouring assignment

5.5.1 ICD890 Camera connections



Abb. 5-10: ICD890 Camera: Electrical connections (standard system)

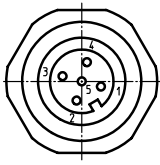
Note All connections have been provided with protective caps for delivery.

“GBIT 1”/“GBIT 2” connections (Ethernet, max. 1GBps)

	Pin	Ethernet signal	Function
	1	TD+	Transmitter+
	2	TD–	Transmitter–
	3	RD+	Receiver+
	4	n. c.	–
	5	n. c.	–
	6	RD–	Receiver–
	7	n. c.	–
	8	n. c.	–

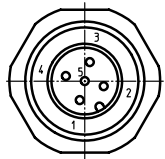
Tab. 5-17: ICD890 Camera: Pin assignment of the 8-pole RJ-45 sockets “GBIT1” and “GBIT2”

“CAN 1-OUT”/“CAN 2-OUT” connections (CAN-SENSOR networks)

	Pin	CAN signal	Function
	1	Shield	Shielding
	2	CAN_V+	Supply voltage 24 V
	3	CAN_GND	Ground
	4	CAN_H	CAN bus (IN/OUT)
	5	CAN_L	CAN bus (IN/OUT)

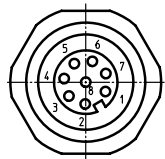
Tab. 5-18: ICD890 Camera: Pin assignment of the 5-pole M12 sockets “CAN 1-OUT”/“CAN 2-OUT”

“CAN 1-IN”/“CAN 2-IN” connections (CAN-SENSOR networks)

	Pin	CAN signal	Function
	1	Shield	Shielding
	2	CAN_V+	Supply voltage 24 V
	3	CAN_GND	Ground
	4	CAN_H	CAN bus (IN/OUT)
	5	CAN_L	CAN bus (IN/OUT)

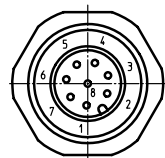
Tab. 5-19: ICD890 Camera: Pin assignment of the 5-pole M12 plugs “CAN 1-IN”/“CAN 2-IN”

“ILLUMINATION” connection (control data interface for illumination)

	Pin	Signal	Function
	1	n. c.	–
	2	LAMP_ON+	Illumination ON/OFF
	3	n. c.	–
	4	n. c.	–
	5	RD+/TD+ (RS 485)	Transmitter+/Receiver+
	6	RD-/TD- (RS 485)	Transmitter-/Receiver-
	7	GND	Ground
	8	n. c.	–

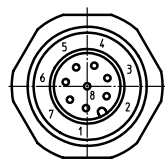
Tab. 5-20: ICD890 Camera: Pin assignment of the 8-pole M12 socket “ILLUMINATION”

“AUX” connection (auxiliary data interface)

	Pin	Signal	Function
	1	n. c.	–
	2	n. c.	–
	3	RD+ (RS 485)	Receiver+
	4	RD-/RxD (RS 485/RS 232)	Receiver-/Receiver
	5	TD+ (RS 485)	Transmitter+
	6	TD-/TxD (RS 485/RS 232)	Transmitter-/Transmitter
	7	GND	Ground
	8	Shield	Shielding

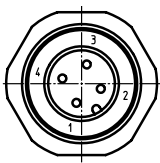
Tab. 5-21: ICD890 Camera: Pin assignment of the 8-pole M12 plug “AUX”

“HOST” connection (main data interface)

	Pin	Signal	Function
	1	n. c.	–
	2	n. c.	–
	3	RD+ (RS 485)	Receiver+
	4	RD-/RxD (RS 485/RS 232)	Receiver-/Receiver
	5	TD+ (RS 485)	Transmitter+
	6	TD-/TxD (RS 485/RS 232)	Transmitter-/Transmitter
	7	GND	Ground
	8	Shield	Shielding

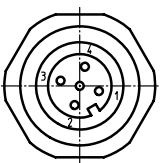
Tab. 5-22: ICD890 Camera: Pin assignment of the 8-pole M12 plug “HOST”

“OUT” connection (digital switching outputs)

	Pin	Signal	Function
	1	Result 1+	Switching output 1
	2	Result 1-	Switching output 1
	3	Result 2-	Switching output 2
	4	Result 2+	Switching output 2

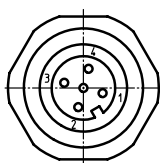
Tab. 5-23: ICD890 Camera: Pin assignment of the 4-pole M12 plug “OUT”

“IN 1” connection (digital switching input 1)

	Pin	Signal	Function
	1	+24 V DC	Power supply for sensor
	2	IN 1-	Switching input 1 (optocoupler)
	3	GND	Ground
	4	IN 1+	Switching input 1 (optocoupler)
	5	-	-

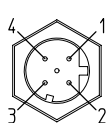
Tab. 5-24: ICD890 Camera: Pin assignment of the 5-pole M12 socket “IN 1”

“IN 2” connection (digital switching input 2)

	Pin	Signal	Function
	1	+24 V DC	Power supply for sensor
	2	IN 2-	Switching input 2 (optocoupler)
	3	GND	Ground
	4	IN 2+	Switching input 2 (optocoupler)
	5	-	-

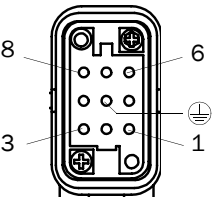
Tab. 5-25: ICD890 Camera: Pin assignment of the 5-pole M12 socket “IN 2”

“HOST ETHERNET” connection (Ethernet 10/100 Mbps)

	Pin	Signal	Function
	1	TD+	Transmitter+
	2	RD+	Receiver+
	3	TD-	Transmitter-
	4	RD-	Receiver-

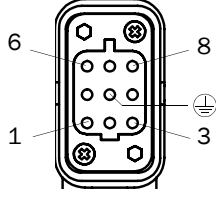
Tab. 5-26: ICD890 Camera: Pin assignment of the 4-pole M12 socket “HOST ETHERNET”

“POWER IN” connection (power supply IN)

	Pin	Signal	Function
	1	+24 V DC (ICD890)	Power supply IN
	2	GND (ICI890_1)	Ground
	3	+24 V DC (ICI890_1)	Power supply IN
	4	–	n. c.
	5	–	n. c.
	6	GND (ICD890)	Ground
	7	+24 V DC (ICI890_2)	Power supply IN
	8	GND (ICI890_2)	Ground
		PE	Protective ground

Tab. 5-27: ICD890 Camera: Pin assignment of the 8-pole Harting HanQ8 plug “POWER IN”

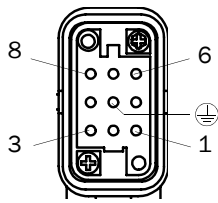
“POWER OUT” connection (power supply OUT for illumination)

	Pin	Signal	Function
	1	–	n.c.
	2	GND (ICI890_1)	Ground
	3	+24 V DC (ICI890_1)	Power supply OUT
	4	–	n.c.
	5	–	n.c.
	6	–	n.c.
	7	+24 V DC (ICI890_2)	Power supply OUT
	8	GND (ICI890_2)	Ground
		PE	Protective ground

Tab. 5-28: ICD890 Camera: Pin assignment of the 8-pole Harting HanQ8 socket “POWER OUT”

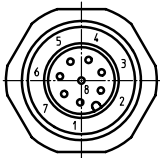
5.5.2 ICI890 Illumination connections

“POWER IN” connection (power supply IN)

	Pin	Signal	Function
	1	–	n.c.
	2	GND (ICI890_1)	Ground
	3	+24 V DC (ICI890_1)	Power supply IN
	4	–	n. c.
	5	–	n. c.
	6	–	n. c.
	7	+24 V DC (ICI890_2)	Power supply IN
	8	GND (ICI890_2)	Ground
		PE	Protective ground

Tab. 5-29: ICI890 Illumination: Pin assignment of the 8-pole Harting HanQ8 plug “POWER IN”

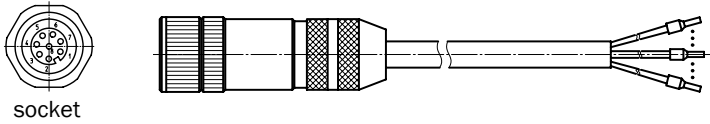
“ILLUMINATION” connection (control data interface)

	Pin	Signal	Function
	1	n. c.	–
	2	LAMP_ON+	Illumination ON/OFF
	3	n. c.	–
	4	n. c.	–
	5	RD+/TD+ (RS 485)	Transmitter+/Receiver+
	6	RD-/TD- (RS 485)	Transmitter-/Receiver-
	7	GND	Ground
	8	n. c.	–

Tab. 5-30: ICI890 Illumination: Pin assignment of the 8-pole M12 plug “ILLUMINATION”

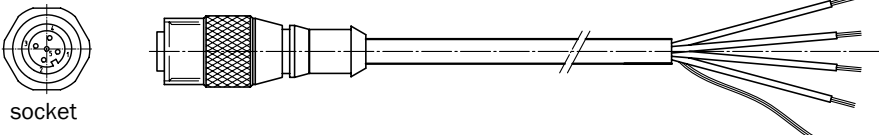
5.5.3 Wire colours assignment of assembled cables with open end

Cable no. 6028420 for the camera (HOST/AUX connections), standard

		
Pin	Signal	Wire colour
1	n. c.	white
2	n. c.	brown
3	RD+ (RS 485)	green
4	RD-/RxD (RS 485/RS 232)	yellow
5	TD+ (RS 485)	grey
6	TD-/TxD (RS 485/RS 232)	pink
7	GND	blue
8	Shield	red

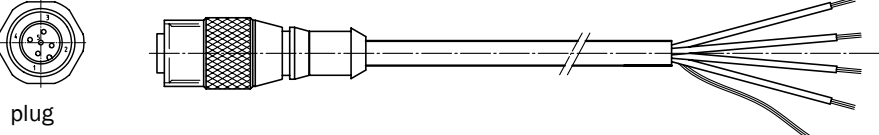
Tab. 5-31: Wire colours assignment: Cable no. 6028420 (HOST/AUX), standard

Cables no. 6021166/no. 6021175 for the camera (CAN 1-IN connection), PVC-free

 socket		
Pin	Signal	Wire colour
1	Shield	–
2	CAN_V+	red
3	CAN_GND	black
4	CAN_H	white
5	CAN_L	blue

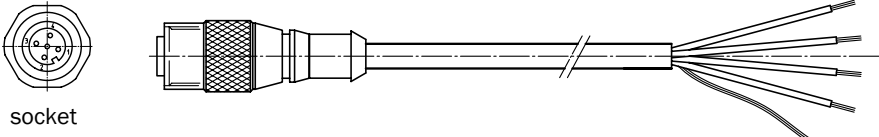
Tab. 5-32: Wire colours assignment: Cables no. 6021166/no. 6021175 (CAN 1-IN), PVC-free

Cable no. 6024861 for the camera (IN 1/IN 2 connections), standard

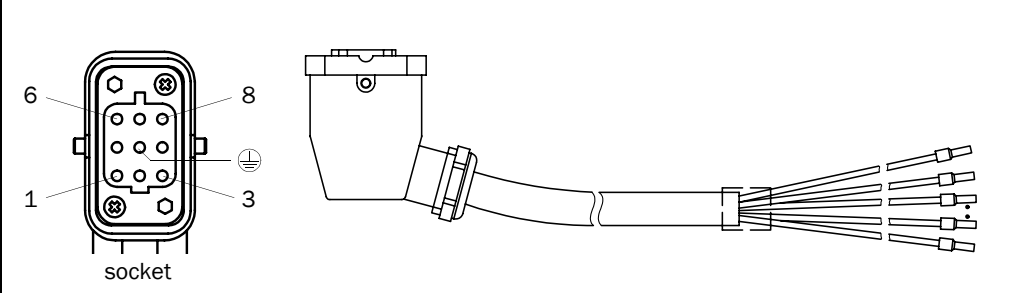
 plug		
Pin	Signal	Wire colour
1	+24 V DC	brown
2	IN 1-/IN 2-	white
3	GND	blue
4	IN 1+/IN 2+	black
5	–	grey

Tab. 5-33: Wire colours assignment: Cable no.6024861 (IN 1/IN 2), standard

Cable no. 6027559 for the camera (OUT connection), standard

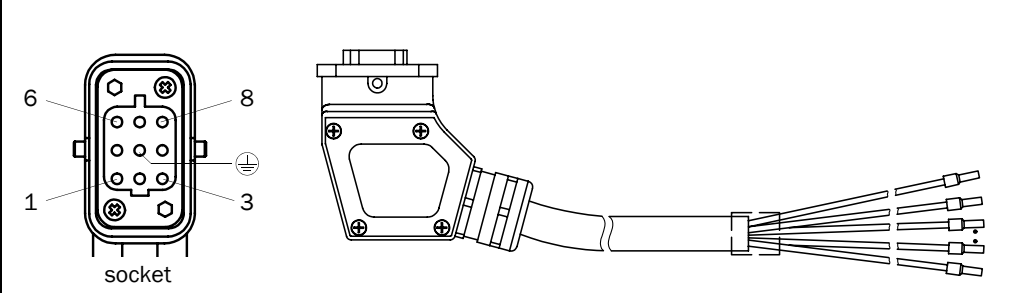
 socket		
Pin	Signal	Wire colour
1	Result 1+	brown
2	Result 1-	white
3	Result 2-	blue
4	Result 2+	black

Tab. 5-34: Wire colours assignment: Cable no. 6027559 (OUT), standard

Cable no. 2039398 for the camera (POWER IN connection), standard


Pin	Signal	Wire colour (numbers printed on wires)
1	+24 V DC (ICD890)	Wire 1: black
2	GND (ICI890_1)	Wire 4: black
3	+24 V DC (ICI890_1)	Wire 3: black
4	-	n. c.
5	-	n. c.
6	GND (ICD890)	Wire 2: black
7	+24 V DC (ICI890_2)	Wire 5: black
8	GND (ICI890_2)	Wire 6: black
	PE	green-yellow

Tab. 5-35: Wire colours assignment: Cable no. 2039398 (ICD890 Camera power supply), standard

Cable no. 2032926 for the camera (POWER IN connection), PVC-free


Pin	Signal	Wire colour (numbers printed on wires)
1	+24 V DC (ICD890)	Wire 1: black
2	GND (ICI890_1)	Wire 4: black
3	+24 V DC (ICI890_1)	Wire 3: black
4	-	n. c.
5	-	n. c.
6	GND (ICD890)	Wire 2: black
7	+24 V DC (ICI890_2)	Wire 5: black
8	GND (ICI890_2)	Wire 6: black
	PE	green-yellow

Tab. 5-36: Wire colours assignment: Cable no. 2032926 (ICD890 Camera power supply), PVC-free

Notes:

6 Operation

The ICR890 System does not require manual operation. Startup, adjustments and diagnosis are carried out via the SOPAS-ET Configuration Software.

6.1 Overview of the startup procedure

- Start up the ICR890 System with the factory default settings.
- Connect the PC with the SOPAS-ET Configuration Software to the ICR890 System or the MSC800.
- In order to optimize the functionality of the system, adjust, if necessary, the ICR890 System and optimize the configuration of the system or the MSC800.
- Check correct functioning of the system in reading operation.

6.2 Configuration Software SOPAS-ET

The SOPAS-ET Configuration Software optimizes the ICR890 System to the reading conditions on site. The configuration data can be saved and archived as a parameter set (project file) on the PC.

6.2.1 Functions of the SOPAS-ET Configuration Software for the ICR890 System/ MSC800 (overview)



The online help in the SOPAS-ET Configuration Software describes the general functions of the software and their operation:

MENU, HELP, HELP F1

- Selecting the menu language (German, English)
- Setup communication with the ICR890 System/MS800
- Password protected configuration for various operating levels
- Presentation of the image storage contents of the ICR890 System
- Recording of data during the current mode (recording and analyzing the data of certain system memory areas via the data recorder)
- System monitoring

6.2.2 System requirements for the SOPAS-ET Configuration Software

PC system requirements: see [Chapter 3.2.4 Operation requirements, page 28](#) or the booklet in the cover of the CD-ROM “Manuals & Software ICR890” (no. 2039442).

6.2.3 Installation of the Configuration Software SOPAS-ET

Note For installation instructions, also see the booklet in the cover of the CD-ROM “Manuals & Software ICR890” (no. 2039442).

1. Start the PC and insert the installation CD.
2. If installation does not start automatically, call setup.exe on the CD.
3. Follow the operating instructions to conclude installation.

6.2.4 Default setting for the SOPAS-ET Configuration Software

Parameter	Value
User interface language	English ¹⁾
Units of length	Metric
User group (operating level)	Machine operator
Download parameter for changes	Immediate, temporary (RAM of the ICR890 System)
Upload parameter after online switching	Automatic
Window layout	3 (project tree, help, work area)
Serial communication	COM 1: 9,600 Bd/19,200 Bd, 8 data bits, 1 stop bit, no parity
1) the software has to be restarted after changes	

Tab. 6-1: Default setting for the SOPAS-ET Configuration Software (excerpt)

6.3 First startup

The ICR890 System is optimized to the reading conditions on site via the SOPAS-ET Configuration Software. Starting point for this is the factory default setting which can be adjusted to optimize the system. The SOPAS-ET Configuration Software is used to create an application-specific parameter set which can be loaded into the system and saved/archived as a project file (spr file with configuration data) on the PC.

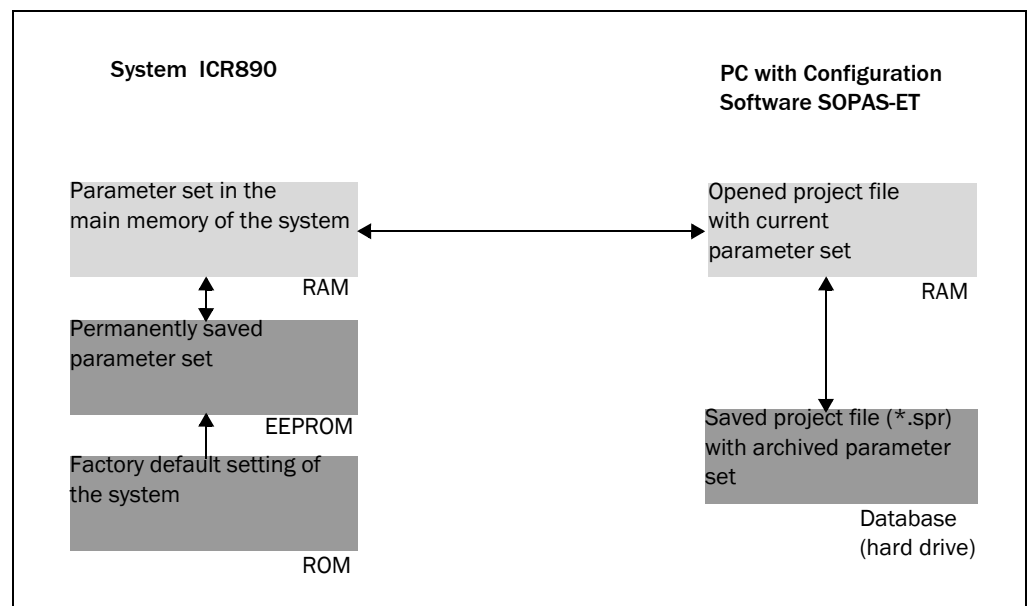


Abb. 6-1: Configuration with SOPAS-ET

Note The ICR890 System does not provide a reading result in configuration mode.

6.3.1 Overview of the configuration procedure

- Connect data interfaces of the PC and the ICR890 System/MS800
- Start the SOPAS-ET Configuration Software and create a new project file
- Configure the scan assistant (activate PC communication)
- Establish communication with the ICR890 System/MS800
- Accept current configuration of the ICR890 System/MS800 in the project tree
- Use the password "client" to register at the system as an "authorized client"
- Configure the ICR890 System/MS800 for use
- Activate the image output of the SOPAS-ET Configuration Software ("Image Viewer") to check the reading
- If necessary, apply the diagnosis tools "Reading Diagnosis" and "Event Monitor" (online presentation/recording of the switching statuses of switching inputs and outputs as well as data transfers to the host)
- Load the optimized configuration into the ICR890 System and save permanently
- Save the project file with the configuration data of the ICR890 System/MS800 at the PC

6.3.2 Establishing communication with the ICR890 System/MS800

Prerequisite The TCP-IP protocol at the PC has to be active to enable communication via TCP-IP.

Connecting data interfaces

- Interconnect the PC and the ICR890 System/MS800 according to [Tab. 6-2](#).

Connection via:	At data interface:	Comment
MS800	ETHERNET 1 (10/100 MBps)	Connect the PC (Ethernet interface), MS800 (ETHERNET 1 connection) and the ICR890 System (HOST ETHERNET connection) to a joint switch using a patch cable no. 6030928 (10 m (32.8 ft)) or no. 6029630 (3 m (9.84 ft)) for each connection.
MS800 (optional)	AUX 1 or HOST 1 (RS 232)	Connect the PC via a 3-wire null modem cable no. 2014054 to the 9-pole D-Sub connector AUX 1 of the MS800.
ICR890 System	HOST ETHERNET (10/100 MBps)	Directly connect the PC (Ethernet interface) to the HOST ETHERNET connection of the ICR890 System via a crossover cable. - or - Use the patch cable (1:1) no. 6030928 (3 m (9.84 ft)) or no. 6029630 (10 m (32.8 ft)) when connecting via a hub.
ICR890 System (optional)	AUX or HOST (RS 232)	Provide the cable no. 6028420 (open end) for connection to the PC with a 9-pole D-Sub socket and, depending on the interface type, configure it as a null modem cable. (For wire colour assignment: see Tab. 5-31, page 75 , transmitter and receiver signals are crossed, see Fig. 5-6, page 66). Connect the PC via the cable no. 6028420 to the AUX connection or the ICR890 System HOST.

Tab. 6-2: Connection between the PC with the SOPAS-ET Configuration Software and the ICR890 System/MS800

Starting the SOPAS-ET Configuration Software and calling the scan assistant

1. Switch on the power supply to the ICR890 System/MS800.
The ICR890 System and the MS800 carry out a self-test and are initialized.
2. Switch on the PC and start the SOPAS-ET Configuration Software.
The SOPAS-ET Configuration Software opens the program window with an English program interface as standard.
3. In order to change the language setting, click on CANCEL and change the language of the program interface to GERMAN/DEUTSCH via the menu TOOLS/OPTIONS.
4. Once the language setting has been changed, shut down the SOPAS-ET Configuration Software, restart.
5. In the dialog window select the option CREATE A NEW PROJECT and click on OK to confirm it.
6. In the main window under SCAN-ASSISTENT click on the CONFIGURATION button.
The dialog window SCAN WIZARD appears.

Configuring the serial connection

1. In the dialog window SCAN WIZARD under SERIAL PORT/STANDARD PROTOCOL check the check box for ENABLE SERIAL COMMUNICATION.
2. Click on the ADVANCED... button.
3. Under BITS PRO SEKUNDE deactivate all the baud rates except 57.6 kbd.
4. Select the following PORT SETTINGS: 8 data bits, no parity, 1 stop bit.
5. Click on OK to confirm settings.
The dialog window ADVANCED SCAN SETTINGS closes.

Configuring the Ethernet connection

1. In the dialog window SCAN WIZARD under INTERNET PROTOCOL/INTERNET PROTOCOL IP check the check box for ENABLE IP COMMUNICATION.
2. Click on the ADD button.
3. Enter the IP address of the ICR890 System and confirm it via OK in the dialog window.
The dialog window closes. A new entry appears in the IP ADDRESS CONFIGURATION list.
4. Click on OK to confirm settings.
The dialog window ADVANCED SCAN SETTINGS closes.

Carrying out a scan

1. In the dialog window SCAN WIZARD click on the SCAN button.
2. Select the listed devices (ICR890 and MS800) and confirm via ADD DEVICE.
Connected devices are searched for via the connection. The SOPAS-ET Configuration Software inserts the found devices in the project tree and uploads the current parameter set (SYNC CHECK).
3. For configuration of the devices see [Chapter 6.3.3, page 83](#).

6.3.3 Configuring the ICR890 System/MS800

The following tables [Tab. 6-3](#) and [Tab. 6-4](#) (ICR890 System **with** MS800) or [Tab. 6-5](#) (ICR890 System **without** MS800) act as guidelines for the configuration.

The function of each respective parameter is explained in a context-sensitive manner in an online help (F1 key). The valid value range and the default setting list the display window "Parameter Info" (right mouse button, when the cursor is positioned over the parameter).



In order to configure a device via the SOPAS-ET Configuration Software, the respective operating level has to be selected in advance. After the start, the SOPAS-ET Configuration Software functions at the operating level "Maintenance".

1. In the menu bar under EXTRAS select the command LOGIN TO DEVICE.
2. In the dialog window under USERLEVEL in the list box select the entry AUTHORIZED CLIENT and enter the word "client" under PASSWORD.
Click on OK to confirm the dialog window.

The previously greyed out parameters on the register tabs are now accessible.

Settings at the ICR890 System for application as a stand-alone device with MS800 (single-side reading)

Step	Entry in the project tree	Register tab	Parameter	
1.	Reading config.	Codelabel properties	Minimum code position Maximum code position Symbol Contrast	
2.	Reading config.	Image capturing properties	Digital zoom Image Resolution	
3.	Object Trigger Control	Start/Stop of Object trigger	Control Start	
4.	Focus Control	Optionen Fokussteuerung	Default Position Focus Control Mode	
5.	Focus Control	Distance Measurement Source	MLG VMS	
6.	Lamp Control	Illumination mode	Lamp on Lamp timeout active Timeout	
7.	Position	Offsets	X-Offset Y-Offset Z-Offset	
8.	Position	Coordinates	X-Coordinate Y-Coordinate Z-Coordinate Distance to deflecting mirror	
9.	Position	Angles	Alpha Beta Gamma	
10.	Increment config.	Increment	Increment source Resolution/Speed	
11.	Image Acquisition	Request	Request Image format Bitmap scaling/JPEG Quality Activate Diagnosis Output Output limited by code position	

Tab. 6-3: ICR890 System (stand-alone device) with MS800: Overview of parameters which have to be set

Step	Entry in the project tree	Register tab	Parameter	
12.	1D Code config.	Symbologies	Codabar Code 39 UPC/EAN Familie 2/5 Interleaved Code 93 Code 128 Familie	
13.	2D Code config.	Symbologies	Data Matrix PDF 417	
14.	Data processing	Tracking	Tracking Mode Object release point	
15.	Output Format	Output Formating #1/#2		
16.	Network Architecture	Master/Slave	Network function	
17.	Serial	Serial Host Interface	Output format Baudrate Stopbits Databits/Parity Hardware Protocol Blockcheck	
18.	Serial	Serial Auxilliary Interface	Mode	
19.	Ethernet	General	IP-Address IP-Mask IP-Gate-Address Speed	
20.	GBit Ethernet	GBit Ethernet 1/2	IP-Address IP-Mask IP-Gate-Address Speed	
21.	CAN	CAN 1/2	Mode Node-ID Baudrate Output format	
22.	Digital Outputs	Output 1/2	Output 1/2 Inverted Control Duration	
23.	Digital Inputs	Sensor 1/2	Control Inverted Debouncing	

Tab. 6-3: ICR890 System (stand-alone device) with MSC800: Overview of parameters which have to be set (cont.)

**Settings at the MSC800 for application of the ICR890 System as stand-alone device
(single-side reading)**

Step	Entry in the project tree	Register tab	Parameter	
1.	Object Trigger Control	Start/Stop of Object trigger	Control Start	
2.	MLG settings			
3.	Increment config.	Increment	Increment source Resolution/Speed	
4.	1D Code config.	Symbologies	Codabar Code 39 UPC/EAN Familie 2/5 Interleaved Code 93 Code 128 Familie	
5.	2D Code config.	Symbologies	Data Matrix PDF 417	
6.	Data processing	Tracking	Tracking mode Object release point	
7.	Output Format	Output Formating #1/#2		
8.	Network Architecture	Master/Slave	Network function	
9.	Serial	Serial Host Interface	Output format Baudrate Stopbits Databits/Parity Hardware Protocol Blockcheck	
10.	Serial	Serial Auxilliary Interface	Mode	
11.	Ethernet	General	IP-Address IP-Mask IP-Gate-Address Speed	
12.	CAN	CAN 1/2	Mode Node-ID Baudrate Output format	
13.	Protokoll	RDT400	RDT ID Enable internal index telegram	
14.	Digital Outputs	Output 1/2	Output 1/2 Inverted Control Duration	
15.	Digital Inputs	Sensor 1/2	Control Inverted Debouncing	
16.	Realtime clock			

Tab. 6-4: ICR890 System (stand-alone device) with MSC800: Overview of parameters which have to be set

Settings at the ICR890 System for application as stand-alone device without MSC800

Step	Entry in the project tree	Register tab	Parameter	
1.	Reading config.	Codelabel properties	Minimum code position Maximum code position Symbol Contrast	
2.	Reading config.	Image capturing properties	Digital zoom Image Resolution	
3.	Object Trigger Control	Start/Stop of Object trigger	Control Start	
4.	Focus Control	Optionen Fokussteuerung	Default Position Focus Control Mode	
5.	Focus Control	Distance Measurement Source	MLG VMS	
6.	Lamp Control	Illumination mode	Lamp on Lamp timeout active Timeout	
7.	Position	Offsets	X-Offset Y-Offset Z-Offset	
8.	Position	Coordinates	X-Coordinate Y-Coordinate Z-Coordinate Distance to deflecting mirror	
9.	Position	Angles	Alpha Beta Gamma	
10.	Increment config.	Increment	Increment source Resolution/Speed	
11.	Image Acquisition	Request	Request Image format Bitmap scaling/JPEG Quality Activate Diagnosis Output Output limited by code position	
12.	1D Code config.	Symbologies	Codabar Code 39 UPC/EAN Familie 2/5 Interleaved Code 93 Code 128 Familie	
13.	2D Code config.	Symbologies	Data Matrix PDF 417	
14.	Data processing	Tracking	Tracking Mode Object release point	
15.	Output Format	Output Formating #1/#2		
16.	Network Architecture	Master/Slave	Network function	
17.	Serial	Serial Host Interface	Output format Baudrate Stopbits Databits/Parity Hardware Protocol Blockcheck	
18.	Serial	Serial Auxilliary Interface	Mode	

Tab. 6-5: ICR890 System (stand-alone device) without MSC800: Overview of parameters which have to be set

ICR890

Step	Entry in the project tree	Register tab	Parameter	
19.	Ethernet	General	IP-Address IP-Mask IP-Gate-Address Speed	
20.	GBit Ethernet	GBit Ethernet 1/2	IP-Address IP-Mask IP-Gate-Address Speed	
21.	CAN	CAN 1/2	Mode Node-ID Baudrate Output format	
22.	Digital Outputs	Output 1/2	Output 1/2 Inverted Control Duration	
23.	Digital Inputs	Sensor 1/2	Control Inverted Debouncing	

Tab. 6-5: ICR890 System (stand-alone device) without MSC800: Overview of parameters which have to be set (cont.)

6.3.4 Load changed parameter sets into the device

Changed parameter values are immediately transferred to the ICR890 System depending on the option ("Download Immediately"). To ensure that the changes remain even after a system restart, the configuration has to be permanently saved in the system.

1. In order to load current settings into the ICR890 System, in the menu bar under ICR890 select the command **PARAMETER/SAVE PERMANENT**.
- or -
In order to load the current settings in the MSC800, select the command **PARAMETER/SAVE PERMANENT** in the menu bar under MSC800.
2. Restart the ICR890 System/MS800.

6.3.5 Save, display and print the current parameter set

When archiving a parameter set it is recommended to not only save the project file but also print out the contents of the file.

1. In order to save the current parameter set, select the menu item **SAVE PROJECT AS** in the menu bar under **PROJECT**.
2. Enter a file name in the dialog window and confirm it via **SAVE**.
The SOPAS-ET Configuration Software saves the current settings in a configuration file "*.SPR".
3. In order to print out the current parameter set, select the command **PRINT/PRINT PREVIEW** in the menu bar under **PROJEKT**.
The SOPAS-ET Configuration Software displays a preview of a table with a list of all the parameter values.
4. Click on  in the tool bar at the top of the dialog window.
The dialog window **PRINT** for printer configuration appears.
5. Edit setting accordingly and confirm via **OK**.
The current project settings are printed as a table on several pages.

6.3.6 Changing the device password for the user level "Authorized Client"

The device password for the user level "AUTHORIZED CLIENT" can be altered device specifically by the customer. This prevents unwanted or unauthorized changes to the configuration.

1. Establish communication with the device (see [Chapter 6.3.2, page 81](#)).
2. In the menu bar under ICR890 select the command PASSWORD/CHANGE PASSWORD.
3. Ensure that the user level "AUTHORIZED CLIENT" has been selected in the dialog window REGISTER.
4. Enter the new password in the field NEW PASSWORD.
The entry occurs as hidden text.
5. Re-enter the new password in the field CONFIRM NEW PASSWORD.
The entry occurs as hidden text.
6. Confirm entries via the LOGIN button.
A message confirms successful device password changes.

6.4 Default setting

The values of the default setting are permanently saved in the ICR890 System (ROM) and in the database of the SOPAS-ET Configuration Software in the device-specific jar file (see [Fig. 6-1, page 80](#)). A PC is not required for system startup with the default setting.

6.4.1 Resetting the default setting in the ICR890 System

Prerequisite The SOPAS-ET Configuration Software is connected online to the ICR890 System.



1. In order to completely discard changes to the parameter set, in the menu bar under ICR890 select the command PARAMETER/LOAD FACTORY DEFAULT.
The SOPAS-ET Configuration Software loads the default setting from the database and displays the parameter values in the register tabs.
2. In the menu bar under EXTRAS select the command LOGIN TO DEVICE.
3. In the dialog window under USERLEVEL in the list box select the entry AUTHORIZED CLIENT and enter the word "client" under PASSWORD.
Click on OK to confirm the dialog window.
4. In the menu bar under ICR890 select the command PARAMETER/SAVE PERMANENT.
The SOPAS-ET Configuration Software transfers the default setting to the permanent parameter memory (EEPROM) of the ICR890 System.

6.4.2 Default setting MSC800

See *MSC800 Operating Instructions* (no. 8011540).

7 Maintenance

7.1 Maintenance during operation

The ICR890 System functions maintenance free. Regular maintenance is not required to guarantee LED class 1M of the ICR890 System.

Note Do not open the ICD890 Camera or the ICI890 Illumination.
If the devices are opened, the manufacturer's warranty shall not apply.

Checking the incremental encoder

If an incremental encoder is used, the position of the friction wheel at the drive system should be checked at regular intervals.

- Ensure that the incremental encoder has contact with the drive system and that the friction wheel rotates without slipping.

7.2 Cleaning the ICR890 System

Recommendation In order to make use of the full optical reading capacity of the ICR890 System, the front window should be checked regularly (e. g. weekly) for soiling. This is especially recommended when operating the device in harsh conditions (dust, abrasion, humidity, finger prints, etc.).

If possible, do not clean the deflection mirror due to its structure.

7.2.1 Cleaning the front window



WARNING

LED radiation of class 1M (according to EN/IEC 60825-1)!

Incorrect use can result in hazardous radiation exposure and the LED class being exceeded!

The accessible radiation of the ICI890 Illumination is not hazardous under reasonably foreseeable conditions, provided that the beam width is not reduced by optical instruments, e.g. magnifying glass, lenses, telescopes. Visual glare, loss of colour vision and eye injuries cannot be ruled out.

The entire window surface is the LED radiation outlet opening.

- Do not look directly into the radiation source with optical instruments.
- Do not open the housing. (The illumination is **not** switched off if the housing is opened!)
- Always observe the latest valid version of laser protection regulations.



ATTENTION

Damage to the front window!

Reduced reading capacity due to scratches or smears on the front window!

The front window of the illumination is made of glass. The opening for the camera within the front window is made of special glass.

- Do not use aggressive cleaning agents.
- Do not use cleaning agents which cause increased abrasion (e. g. powder).
- Avoid cleaning motions at the front window which could cause scratches or abrasion.

Cleaning the front window

- Note** Electrostatic charges cause dust particles to stick to the front window. This effect can be combated by using anti-static SICK synthetic cleaner (no. 5600006) in combination with a SICK lens cloth (no. 4003353).
- Use a clean, soft brush to free the front window from dust.
 - If necessary, additionally clean the front window with a clean, damp, lint-free cloth and a mild, anti-static window cleaning fluid.

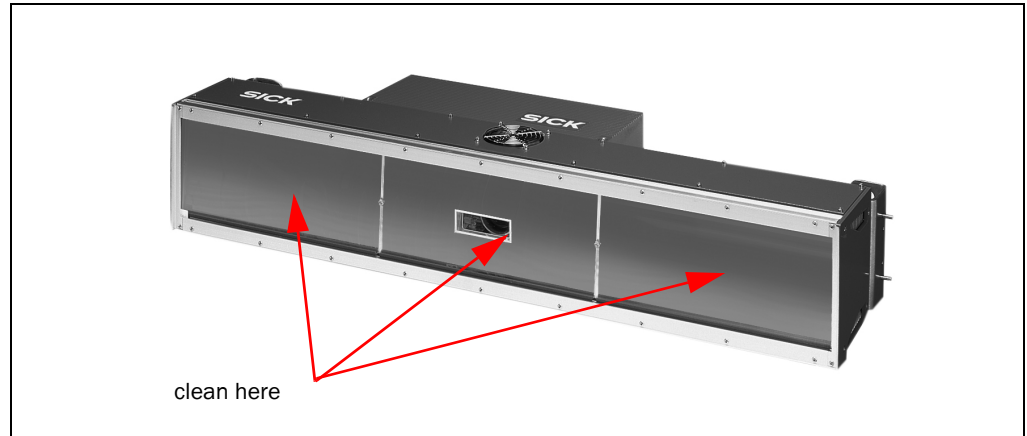


Abb. 7-1: Cleaning the front window

If the front window is scratched or damaged (cracked, broken), it must be replaced. Please contact the SICK Service.

7.2.2 Cleaning the housing

In order to ensure sufficient cooling for the illumination, make sure that the air inlet and outlet opening are always clean.

- Use a soft brush to free the openings at the ventilator on top of the housing and at the cooling ribs of the air outlet openings on both narrow sides from dust.

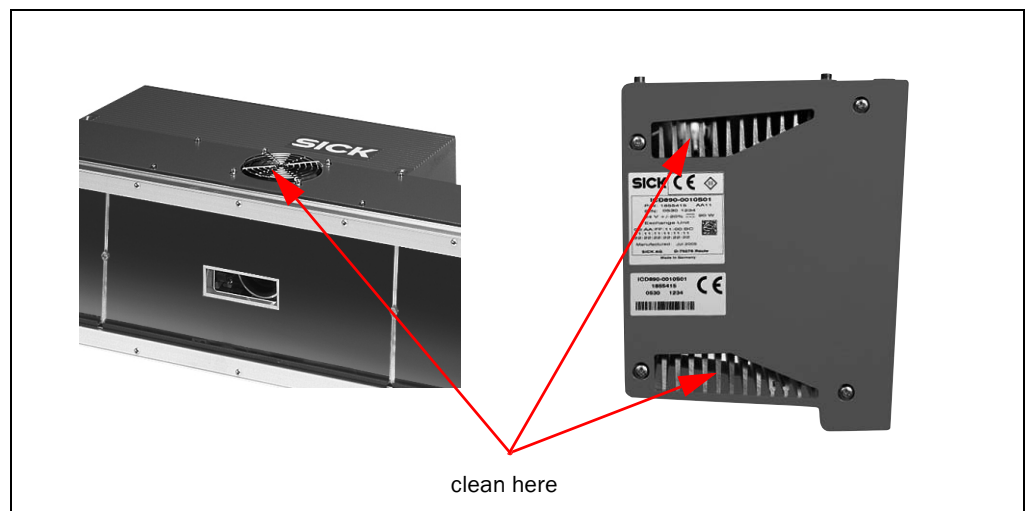


Abb. 7-2: Cleaning the air inlet and outlet openings at the system's illumination ICR890

7.2.3 Cleaning the deflection mirror



Damage to the optical effective surface of the deflection mirror!

Incorrect cleaning or aggressive cleaning agents can damage the deflection mirror, thus impairing the reading quality of the ICR890 System.

- If possible, do not clean the deflection mirror.
- Only clean the reflector surface if absolutely necessary (e. g. heavy soiling). Never touch the entire reflector surface.
- Do not use canned compressed air.
- To avoid irreversible scratches, **never** clean the mirror with a cloth.

Removing dust and loose dirt particles

- Carefully blow off dust and loose dirt particles using **cleaned, oil-free air**. Do not use canned compressed air, since it can contain alkaline substances which corrode the surface of the mirror.

Removing solid particles

- Carefully remove more solid particles with a degreased camel hair brush (previously treated with acetone). Ensure that acetone does not come into direct contact with the reflector surface.

Cleaning the deflection mirror intensively

1. Fill a clean plastic spray bottle with distilled water.
2. Evenly spray distilled water onto the reflector surface.
Keep the mirror tilted, allowing the distilled water to drip dry.
3. Allow the mirror to dry. **Do not wipe the mirror dry!**

Removing grease deposits

1. Spray affected areas with household glass cleaner.
2. Use a paper towel (recommended: "Kleenex") to wipe the affected area. Only apply slight pressure to the mirror. Do not scour.
3. Allow the mirror to dry. **Do not wipe the mirror dry!**

7.2.4 Cleaning further optical effective surfaces

Depending on the system equipment, further sensors with optical effective surfaces can be installed (e. g. photoelectric reflex switch for external reading pulsing or MLG Light Grid for detecting the object distance). Soiling of these sensors can cause incorrect switching behaviour.

- In order to prevent incorrect switching behaviour, remove soiling from the optical effective surfaces of the external sensors.

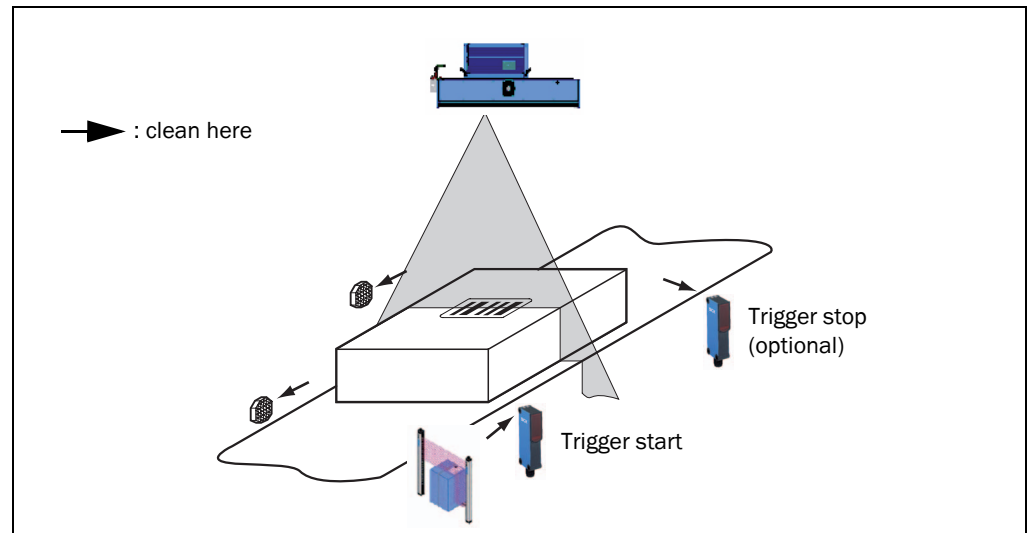


Abb. 7-3: Cleaning of the external optical sensors (reading pulse generator, detector for object distance)

7.3 Replacing a system or a component

Incorrect or damaged system components have to be removed and replaced with either new or repaired components.

Repairs to the ICR890 System should only be carried out by qualified and authorized SICK AG service staff.



Risk of injuries due to falling components!

The combined weight of the ICD890 Camera and the ICI890 Illumination is approx. 37 kg (81.6 lb) without installation accessories.

- Do **not** carry out removal / installation work alone.
- A second person should always secure components during removal / installation.

7.3.1 Replacing the ICD890 Camera or ICI890 Illumination

Removing connection cables

1. Switch off the power supply to the ICR890 System.
2. Loosen and disconnect all external cable connectors and sockets at the camera.
3. Remove both connecting cables between the camera and the illumination.

Disconnecting system components

1. Loosen, but do **not** remove, the two clamping screws in the curved grooves of both 180° brackets!

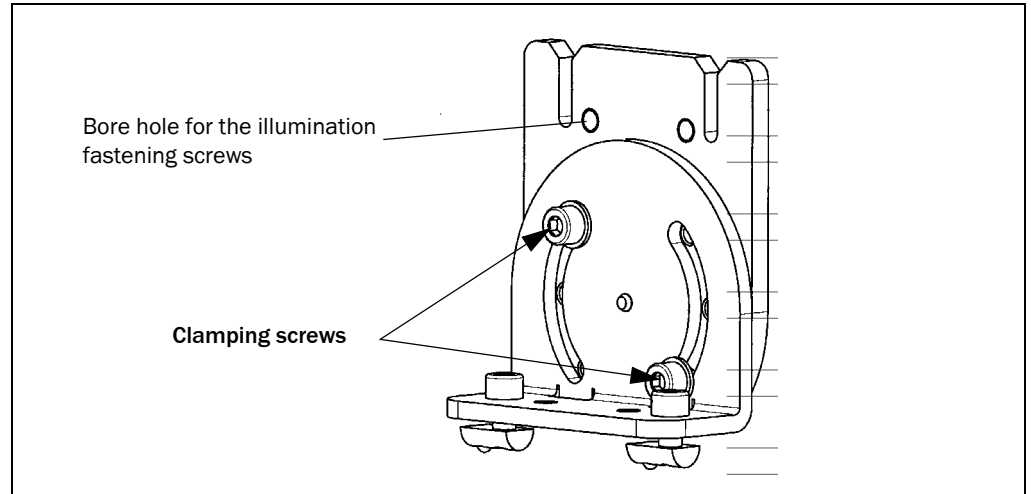


Abb. 7-4: 180° bracket: Loosening clamping screws

2. Carefully swing the ICR890 System until the front window of the illumination is facing downwards.
3. Remove the camera from the illumination.
To achieve this, loosen the four hexagon socket screws of the camera ([Fig. 3-2, page 24, centering pin with thread](#)) and carefully extract the camera upwardly out of the illumination.

Replacing the illumination

1. Note the installation position of the illumination when suspended (e. g. position of the round ventilator opening in relation to the direction of transport).
2. Remove both clamping screws for the illumination from the two 180° brackets.
3. Lift the illumination out of the bracket grooves and remove it from the frame.
4. Insert a new illumination the right way round into the two 180° brackets and subsequently tighten the two clamping screws in each bracket.
The front window of the illumination faces downwards.

Replacing the camera

1. Remove the memory card with the saved parameter set from the defective camera ([Fig. 3-13, page 41](#)).
2. Insert the memory card into the empty slot of the new camera accordingly.
Close the slot cover.
3. Remove the yellow and black protective caps from the lens protection tube and from the lens of the new camera. **Do not touch the lens!**
4. Align the camera the right way round on the illumination and carefully insert the lens protection tube into the illumination opening.
5. Place the camera on the illumination and attach it using four hexagon socket screws.
6. Align the complete unit parallel to the conveyor level.
7. Use the clamping screws to fix the 180° brackets.

Reconnecting cables

1. Reconnect both connecting cables between the system components.
2. Reconnect all external cables to the camera.
3. Switch on the power supply to the ICR890 System.
The ICR890 System starts up and loads the parameter set from the memory card into its permanent parameter memory (EEPROM) after initialisation.

7.3.2 Replacing the deflection mirror

1. Mark the installation position of the deflection mirror when suspended (e. g. mark the position of the illumination surface).
2. Loosen the clamping screws on both sides, place the mounting plate of the 180° bracket in a vertical position and retighten the clamping screws.
3. Unscrew the fastening screws and remove the deflection mirror from the 180° brackets.
4. Insert the guide pins of the new deflection mirror into the grooves of the 180° brackets.
5. Use two fastening screws to attach the deflection mirror to the 180° brackets.
6. Loosen the clamping screws, adjust the deflection mirror to the desired angle with the illumination switched on and retighten the clamping screws.
7. Remove the protective film from the new deflection mirror.

Note The deflection mirror can also be removed without changing the angle of the 180° brackets. The deflection mirror must, however, be held securely when removing the fastening screws.

7.4 Disposal

Inoperable or irreparable devices must be removed and disposed of in an environmentally friendly manner in accordance with valid country-specific waste disposal guidelines.

At present SICK AG will not accept the return of any devices which can no longer be operated or repaired.

Removing ICR890 Systems for decommissioning

1. Switch off the power supply to the ICR890 System.
2. Disconnect all the connection cables at the ICR890 System.
3. Release the ICR890 System from the two brackets and remove it from the frame.
4. Remove both connecting cables between the camera and the illumination.
5. Loosen the four hexagon socket screws ([Fig. 3-2, page 24](#)) and carefully extract the camera from the illumination.

Disposing of the ICR890 Illumination

1. Remove the illumination housing.
2. Remove the electronic assemblies of the illumination and dispose of them as hazardous waste.
3. Remove the front window of the illumination and set it aside for glass recycling.
4. Set aside the fresnel lens for plastics recycling.
5. Set aside the illumination housing for the recycling of aluminium pressure die castings.

Disposing of the ICD890 Camera

1. Remove the camera housing.
2. Remove the electronic assemblies of the camera.
3. **Remove the battery on the internal PC card from its holder and dispose of it as hazardous waste according to ROHS Directives (Europe).**

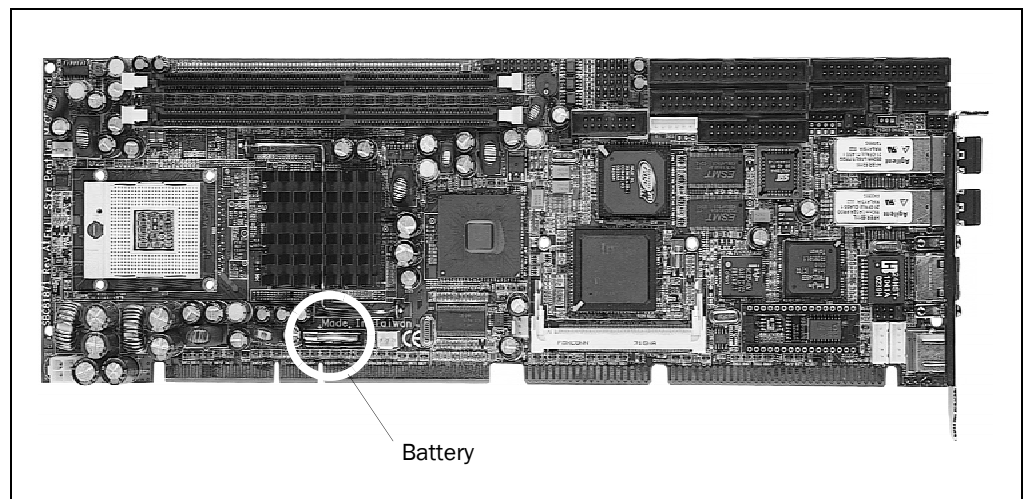


Abb. 7-5: ICD890 Camera: Position of the battery on the internal PC card

4. Set aside the camera lens for glass recycling.
5. Dispose of electronic assemblies as hazardous waste.
6. Set aside the housing and the cover of the camera as well as the lens assembly for the recycling of aluminium pressure die castings.
7. Set aside the connection cables for metal recycling.

Notes:

8 Troubleshooting

This chapter describes how errors at the ICR890 High-end CCD Camera System can be recognised and eliminated.

8.1 Overview of errors and malfunctions which could occur

8.1.1 Installation error

- The ICR890 System has been unsuitably aligned to objects with 1-D/2-D codes (e.g. visual glare)
- Reading pulse sensor has been incorrectly positioned (e.g. internal reading gate opens too late or shuts too early)
- Focus switching: Sensors for detecting object heights positioned incorrectly
- Incremental encoder (optional) positioned incorrectly

8.1.2 Electrical installation error

- Interfaces of the ICR890 System wired incorrectly

8.1.3 Configuration error

- Functions have not been adjusted to the local conditions, e. g. parameters for the main data interface set incorrectly
- Device-related limits have not been considered, e. g. reading distance, aperture angle
- Selected trigger source for reading pulse incorrect

8.1.4 Malfunctions during operation

- Start/Stop operation: External reading pulse is missing, more than one object is in the reading area
- Tracking operation: Minimum gap of the objects in the direction of transport not achieved
- Timeout of the ICR890 Illumination exceeded
- Device error (hardware/software)

8.2 Detailed malfunction analysis

8.2.1 LEDs at the camera

The following statuses can, among other things, be read at the LEDs for the electrical connections of the ICD890 Camera (see [Chapter 3.5.2, page 42](#)):

- Result of the self-test
- Operating status
- Status of the reading result
- Required maintenance or service work

The LEDs can display possible malfunctions or errors. Please refer to the system information for further details.

8.2.2 System information

The ICR890 System displays errors in various ways. The error output is hierarchised and always allows a detailed analysis:

- Communication errors can occur while transmitting telegrams to the ICR890 System. In this case, the ICR890 System returns an error code.
- Error codes are written into a status protocol for errors which occur during a reading.

8.2.3 Status protocol

- Note**
- The status protocol remains even after switching the device off and on again.
 - The system differentiates between four error types:
 - Information
 - Warning
 - Error
 - Fatal error

The system only saves the last five entries for each of the error types.

Displaying the status protocol with the aid of the SOPAS-ET Configuration Software

In order to display the status protocol, the SOPAS-ET Configuration Software has to be online and connected to the ICR890 System.



- Connect the SOPAS-ET Configuration Software to the device.
- Open the project tree IRC890, SERVICE, SYSTEM STATUS, register tab SYSTEM INFORMATION.

Reading the status protocol with the aid of command strings

The status protocol can also be read with the aid of command strings. There is a telegram available for each error type.

- Send the telegram from the command **sRN** (SOPAS read by name) and the telegram name to the ICR890 System, e. g. via the terminal in the SOPAS-ET Configuration Software.

The ICR890 System sends an answer consisting of **sRA** (SOPAS write answer) the telegram name, an error code (00000000h = no error) and information, warnings, errors or fatal errors.

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Query warnings

Request: sRN MSwarn

Telegram part	Description	Variable type	Length (byte)	Value range
Type of command	Request (SOPAS write by name)	string	3	sRN
Command	Query warnings	string	6	MSwarn

Tab. 8-1: Request "Query warnings"

Answer: sRA MSwarn ParameterWARNING1 (Error code FirstTimePwrOnCnt FirstTimeOpHours FirstTimeDailyOpHours LastTimePwrOnCnt LastTimeOpHours LastTimeDailyOpHours Number ReservedBytes) ParameterWARNING2 ParameterWARNING3 ParameterWARNING4 ParameterWARNING5

Telegram part		Description	Variable type	Length (byte)	Value range
Type of command		Answer (SOPAS answer)	string	3	sRA
Command		Query warnings	string	6	MSwarn
Parameters are repeated five times (per memory for warnings, irrespective of whether it is full or not)	Error code	Hex value of the saved error code	uint_32	4	00000001h ... FFFFFFFFh
	FirstTimePwrOnCnt	Status of the power on counter at the time of the first occurrence	uint_16	2	0000h ... FFFFh
	FirstTimeOpHours	Status of the total operating hours counter at the time of the first occurrence	uint_16	2	0000h ... FFFFh
	FirstTimeDailyOpHours	Status of the operating hours counter at the time of the first occurrence	uint_16	2	0000h ... FFFFh
	LastTimePwrOnCnt	Status of the power on counter at the time of the last occurrence	uint_16	2	0000h ... FFFFh
	LastTimeOpHours	Status of the total operating hours counter at the time of the last occurrence	uint_16	2	0000h ... FFFFh
	LastTimeDailyOpHours	Status of the operating hours counter at the time of the last occurrence	uint_16	2	0000h ... FFFFh
	Number	Displays a number of the occurrence	uint_16	2	0000h ... FFFFh
Reserved bytes		Reserved	uint_16	2	0000h

Tab. 8-2: Answer to the request "Query warnings"

Example for querying warnings

Request: sWN MSwarn

Answer: sWA MSwarn 4C0ACC0Ah 00A4h 0255h 0005h 00A4h 0256h 0006h 0256h 0000h 4C0ACC0Bh 00A4h 0255h 0005h 00A4h 0256h 0006h 0256h 0000h 4C0ACC0Ch 00A4h 0255h 0005h 00A4h 0256h 0006h 0256h 0000h 4C0ACC0Bh 00A4h 0255h 0005h 00A4h 0256h 0006h 0256h 0000h 4C0ACC0Ch 00A4h 0255h 0005h 00A4h 0256h 0006h 0256h 0000h

Query errors

Request: sRN MSerr

Telegram part	Description	Variable type	Length (byte)	Value range
Type of command	Request (SOPAS write by name)	string	3	sRN
Command	Query errors	string	5	MSerr

Tab. 8-3: Request “Query errors”

Answer: sRA MSwarn ParameterWARNING1 (Error code FirstTimePwrOnCnt FirstTimeOpHours FirstTimeDailyOpHours LastTimePwrOnCnt LastTimeOpHours LastTimeDailyOpHours Number ReservedBytes) ParameterWARNING2 ParameterWARNING3 ParameterWARNING4 ParameterWARNING5

Telegram part	Description	Variable type	Length (byte)	Value range
Type of command	Answer (SOPAS answer)	string	3	sRA
Command	Query errors	string	5	MSerr
	Parameters see Tab. 8-2			
Reserved bytes	Reserved	uint_16	2	0000h

Tab. 8-4: Answer to the request “Query errors”

Example

Request: sRN MSerr

Answer: sRA MSerr 4303C303h 00A4h 0255h 0005h 00A4h 0256h 0006h 0256h 0000h 00000000h
0000h 0000h 0000h 0000h 0000h 0000h 0000h 0000h 00000000h 0000h 0000h 0000h 0000h
0000h 0000h 0000h 0000h 00000000h 0000h 0000h 0000h 0000h 0000h 0000h 0000h 0000h
00000000h 0000h 0000h 0000h 0000h 0000h 0000h 0000h 0000h

Query fatal errors

Request: sRN MSfat

Telegram part	Description	Variable type	Length (byte)	Value range
Type of command	Request (SOPAS write by name)	string	3	sRN
Command	Query fatal errors	string	5	MSfat

Tab. 8-5: Request “Query fatal errors”

Answer sRA MSfat ParameterFATALERROR1 (Error code FirstTimePwrOnCnt FirstTimeOpHours FirstTimeDailyOpHours LastTimePwrOnCnt LastTimeOpHours LastTimeDailyOpHours Number ReservedBytes) ParameterFATALERROR2 ParameterFATALERROR3 ParameterFATALERROR4 ParameterFATALERROR5

Telegram part	Description	Variable type	Length (byte)	Value range
Type of command	Answer (SOPAS answer)	string	3	sRA
Command	Query fatal errors	string	5	MSfat
	Parameters see Tab. 8-2			
Reserved bytes	Reserved	uint_16	2	0000h

Tab. 8-6: Answer to the request “Query fatal errors”

Example

Request: sRN MSfat

Answer: sRA MSfat 4912C912h 00A4h 0255h 0005h 00A4h 0256h 0006h 0256h 0000h 00000000h
0000h 0000h 0000h 0000h 0000h 0000h 0000h 0000h 00000000h 0000h 0000h 0000h 0000h
0000h 0000h 0000h 0000h 00000000h 0000h 0000h 0000h 0000h 0000h 0000h 0000h
00000000h 0000h 0000h 0000h 0000h 0000h 0000h 0000h 0000h

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8.3 ST error status in the reading result of a 1-D code (bar code)

With the respective configuration, the ICR890 System transfers the ST error status to the output string of the HOST data interface.

Value	Meaning	Possible cause	Remedy
0	Error-free reading "Good Read"	–	n/a
1	Wrong check digit	The check digit which the ICR890 System calculated during the reading does not correspond to the printed check digit in the bar code area.	Check the correctness of the check digit created during the printing process in the bar code area.
2	No code of the released bar code type found according to the analysis conditions	- No bar code during the reading pulse in the reading area of the ICR890 System - Bar code type/length in the ICR890 System not released for decoding - Reading window covered/soiled	- Synchronize the reading pulse of the ICR890 with the occurrence of a bar code in the reading area. - Configure the bar code correctly. - Check the reading window.
5	Required number of identical multiple readings for the bar code not achieved	- Conveyor speed of the object too high - Scanning frequency too low - With scalariform arrangement of the bar code in the direction of transport: Bar code height (strip length) too small - Poor print quality	- Check conveyor speed. - Adjust the parameter "Object speed" in the ICR890 System. - Check the bar code height - Check the print quality
7	The source of the reading result is the auxiliary input via the Aux interface	The bar code was not been detected by the reading of the ICR890 System, but subsequently entered via the auxiliary function of the Aux interface and transferred to the host in a separate data string.	n/a
9	The function OUTPUT FILTER is additionally active for the bar code comparison. The ICR890 System has detected valid bar codes, but these do not correspond to the active set code(s)	The detected object does not have a bar code which corresponds to the specified set code.	n/a
A	Function CHECK MAX. NUMBER OF CODES is active. The ICR890 System has detected more valid bar codes in the reading pulse than specified under NUMBER OF CODES: MAXIMUM. Instead of the bar code contents, it displays the number of the defined error string, as defined under NUMBER OF CODES: MINIMUM.	In a batch of objects with a constant number of bar codes, an object has, e.g., more bar codes than defined.	The message serves as the display of an error for the objects (e.g. test for sort pure: mixing with the incorrect object).
D	For code 39 the analysis option "Code 32" is activated. The ICR890 System attempts to interpret 6-digit C39 bar codes as C32 bar codes (output of 9-digit decimal numbers).	The read 6-digit bar code is not a C32 bar code. ICR890 System displays the defined error string instead.	n/a

Tab. 8-7: Meaning of the ST error status in the reading result

Value	Meaning	Possible cause	Remedy
F	Function CHECK MIN. NUMBER OF CODES PRÜFEN is active. The ICR890 System has detected less valid bar codes in the reading pulse than specified under NUMBER OF CODES: MINIMUM. Instead of the bar code contents, it displays the number of the defined error string, as defined under NUMBER OF CODES: MINIMUM.	In a batch of objects with a constant number of bar codes an object has less bar codes than defined.	The message serves as the display of an error for the objects (e.g. test for sort pure: mixing with the incorrect object).

Tab. 8-7: Meaning of the ST error status in the reading result (cont.)

8.4 SICK support

If a system error occurs repeatedly or if you cannot correct an error using the above measures, the ICR890 System may be defective. The system components cannot be repaired by the user, meaning that it is not possible to re-establish functions after a failure. However, the camera or the illumination can be rapidly replaced by the user. See [Chapter 7.3 Replacing a system or a component, page 93](#).

- Please contact our local SICK office or subsidiary if an error occurs which cannot be eliminated:
 - The telephone numbers and email addresses are listed on the *back page* of this manual.

For postal addresses see also **www.sick.com**.
- Do not send the device to the SICK service without first contacting us.

ICR890

9 Technical data

9.1 Data sheet for ICR890 Camera

Type	ICD890 Camera (standard)
Function	Camera
MTBF of the device	> 50,000 h
MTTR of the device ¹⁾	< 20 min
CCD sensor (lines)	Line camera with 8,192 pixels
Line frequency (line rate)	Max. 19.1 kHz
Image resolution	250 dpi for a reading distance of 2 m (6.56 ft) 170 dpi for a reading distance of 3 m (9.84 ft)
Useable aperture angle	Max. 25° up to a reading distance of 2.4 m (7.87 ft)
Cover track width of the conveyor system	1,000 mm (39.4 in) for a resolution of 170 dpi 600 mm (23.6 in) for a resolution of 250 dpi
DOF (depth of field)	1,600 mm (63.0 in) for a resolution of 170 dpi 600 mm (23.6 in) for a resolution of 250 dpi
Reading areas	1.4 to 3 m (4.59 to 9.84 ft)
Max. conveyor speed (objects)	1.9 m/s (374 ft/min) for a resolution of 250 lpi 2.8 m/s (551 ft/min) for a resolution of 170 lpi 4.8 m/s (945 ft/min) for a resolution of 100 lpi
Supported objects	Standard (focal distance 135 mm (5.32 in))
Focus	Dynamic
Image data output format	GigE Vision Standard ²⁾ or FTP
Ambient light compatability	2,000 lx (on 1-D/2-D code)
PCS (print contrast)	≥ 40 %
1-D code types (bar codes)	2/5 interleaved, code 39, code 128, EAN/UPC with add-on, Codabar, EAN 128
2-D code types	Data Matrix ECC200, PDF417 (in preparation)
Number of objects per second	Max. 10
Minimum object gap	50 mm (1.97 in)
Number of codes per object	1-D: max. 50, 2-D: max. 10
Number of characters per 1-D code	Max. 50 characters (max. 1,000 characters across all 1-D codes per reading gate)
Number of characters per 2-D code	Max. 1,556 bytes
Pressure ratio 1-D code	2:1 to 3:1
Number of multi-readings (1-D code)	1 to 99
Memory card for parameter (cloning)	SD card, 64 MB
Optical indicators	5 x LED (status indicators)
Reading pulse	Switching input "sensor 1"/"sensor 2" command (data interface)/CAN
Pulse start/Pulse end delay	0 to 10,000 ms (for reading pulse switching input/serial interface)
"Host" data interface	RS 232, RS 422/485, adjustable data output format
Data transfer rate	9.6 to 115.2 kbd
Protocols	SICK standard
"CAN" data interface	2 x, 10 KBps to 1 MBps, CAN open protocol, CAN-SENSOR network
"Ethernet" data interface	10/100 MBps, TCP/IP, FTP, half/full duplex
"GBit Ethernet" data interface	2 x, 10 MBps to 1 GBps, real-time image output, FTP and Gig-E Vision standard, Half/Full duplex

Tab. 9-1: Technical specifications for the ICR890 Camera

Type	ICD890 Camera (standard)
"AUX" data interface	RS 232, RS 422/485, adjustable data output format
Data transfer rate	57.6 Kbps
IN switching inputs	2 x digital ("sensor 1/2"), configurable, optically decoupled, $V_{imax} = 28 \text{ V}$, reverse polarity protected Function: "Start/Stop reading pulse", increment signal or ICI890 Illumination triggering Control: Time or path-based Debouncing: Min. 3 ms Selectable logic analyzer (low -> high, high -> low)
OUT switching outputs	2 x digital ("Out 1/2"), configurable, PNP, $I_{omax} = 100 \text{ mA}$, short-circuit proof Function: Good read, no read or device ready Adjustable impulse duration (stat., 10 to 990 ms) Selectable logic analyzer (low -> high, high -> low)
Electrical connections	4 x 5-pole M12 (CAN 1-IN, -OUT; CAN 2-IN, -OUT) 3 x 8-pole M12 (AUX, HOST, ILLUMINATION) 4 x 4-pole M12 (IN 1, IN 2, OUT, HOST ETHERNET) 2 x RJ-45 socket (GBIT ETHERNET) 2 x 8-pole Harting connector POWER IN/POWER OUT
Operating voltage	24 V DC $\pm 10 \%$ in accordance with IEC 364-4-41 (VDE 0100 Part 410)
Current consumption	Typically 75 W
Housing	Aluminium die-casting. Excluding the housing, the system does not contain any materials using silicone.
Enclosure rating	IP 64 (in accordance with DIN 40 050)
Protection class	Class 3 (in accordance with IEC 1010-1)
EMC/vibration/shock test	In accordance with EN 61000-6-2:2001, EN 61000-6-4:2001/ IEC 68-2-6/ IEC 68-2-27, IEC 68-2-29
Dimensions ³⁾	See Fig. 9-4, page 108
Weight	Approx. 13.5 kg (29.7 lb)
Fixing	To the ICI890 Illumination, 4 x M8 bolt with centering pin
Ambient operating temperature/Storage temperature	0 to +40 °C (+32 to +104 °F)/-20 to +70 °C (-4 to +158 °F)
Max. rel. humidity	95 %, no condensation
Colour	SICK Blue (RAL 5012)
1) Camera and illumination can be replaced independently of each other. 2) In preparation 3) Including decoder	

Tab. 9-1: Technical specifications for the ICR890 Camera (contd.)

ICR890

9.2 Data sheet for ICI890 Illumination

Type	ICI890 Illumination
Function	LED illumination
Wavelength	Red light ($\lambda = 620 \text{ nm}$)
LED class	1M (in accordance with EN/IEC 60825-1), illumination switches off after 3 s ¹⁾
Power-on time	Reading pulse-dependent, minimum power-on time 3 s
MTBF of the device	> 50,000 h
MTTR of the device ²⁾	< 20 min
Electrical connections	1 x 8-pole M12 (camera control) 1 x 8-pole Harting connector Power IN
Operating voltage	24 V DC $\pm 10 \%$ in accordance with IEC 364-4-41 (VDE 0100 Part 410)
Current consumption	Typically 350 W
Housing	Aluminium die-casting. Excluding the housing, the system does not contain any materials using silicone.
Enclosure rating	IP 64 (in accordance with DIN 40 050), IP 54 ventilator
Protection class	Class 3 (in accordance with IEC 1010-1)
EMC/vibration/shock test	In accordance with EN 61000-6-2:2001, EN 61000-6-4:2001/ IEC 68-2-6/ FC Test / IEC 68-2-27 EA Test
Dimensions	See Fig. 9-4, page 108
Weight	Approx. 23.5 kg (51.7 lb)
Fixing	2 x angle support (U-shaped), including 2 x guide pin each $\varnothing 6 \text{ mm}$ (0.24 in) and 2 x M8 threaded hole for use in 180° brackets
Ambient operating temperature/Storage temperature	0 to +40 °C (+32 to +104 °F)/-20 to +70 °C (-4 to +158 °F)
Max. rel. humidity	95 %, no condensation
Colour	SICK Blue (RAL 5012)
1) (Default setting)	
2) Camera and illumination can be replaced independently of each other.	

Tab. 9-2: Technical specifications for the ICI890 Illumination

9.3 Data sheet for deflection mirror

Order no.	2039600
Function	Deflection mirror
Material	Glass
MTTR of the device	< 20 min
Housing	Aluminium
Dimensions	See Fig. 9-4, page 108
Weight	7 kg (15.4 lb)
Fixing	2 sided, 2 x guide pin each $\varnothing 6 \text{ mm}$ (0.24 in) and 2 x M8 threaded hole, for use in 180° brackets
Ambient operating temperature/Storage temperature	0 to +40 °C (+32 to +104 °F)/-20 to +70 °C (-4 to +158 °F)
Max. rel. humidity	95 %, no condensation
Colour	SICK Blue (RAL 5012)

Tab. 9-3: Technical specifications for deflection mirror

9.4 Specification diagram

9.4.1 Reading conditions for the diagram

Test code	Code 128
Code quality	A or B, in accordance with ANSI
Print contrast	> 90 %
Ambient light	< 2,000 lx
Minimum resolution	2 pixels/module
Tilt	360°
Pitch	-15° to +15°
Skew	-15° to +15°

Tab. 9-4: Reading conditions for the specification diagram

9.4.2 Reading areas of the ICR890 System

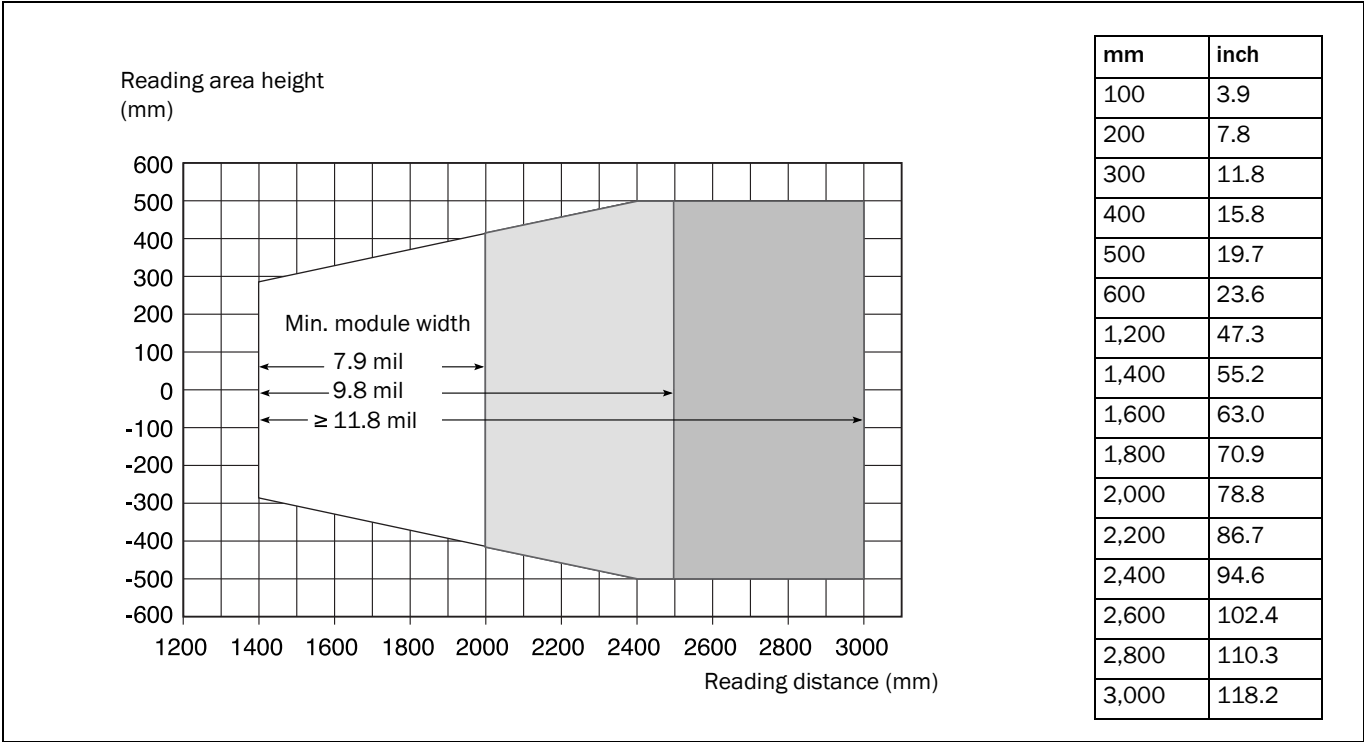


Abb. 9-1: Reading areas of the ICR890 System (standard)

ICR890

9.4.3 Max. resolution across the direction of transport

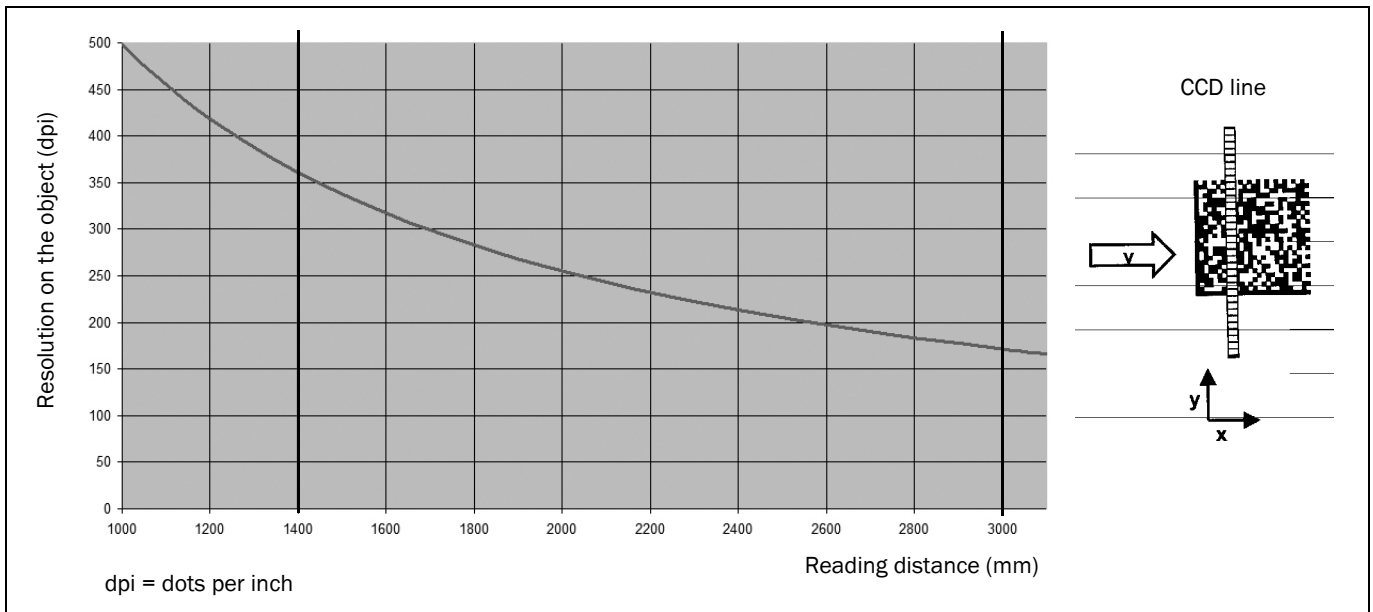


Abb. 9-2: Pixel resolution across the direction of transport (standard device, 135 mm (5.32 in) lens)

9.4.4 Max. resolution in the direction of transport

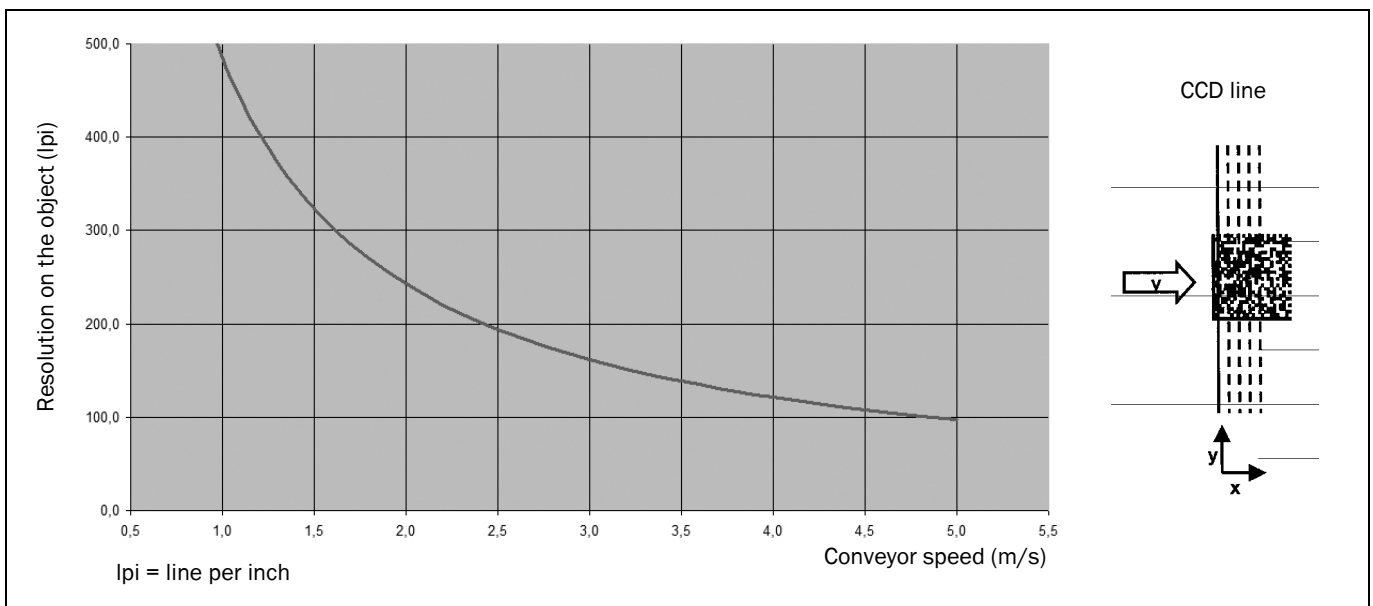


Abb. 9-3: Line resolution in the direction of transport (standard device, 8,192 pixels CCD sensor)

9.5 System dimensional drawing ICR890

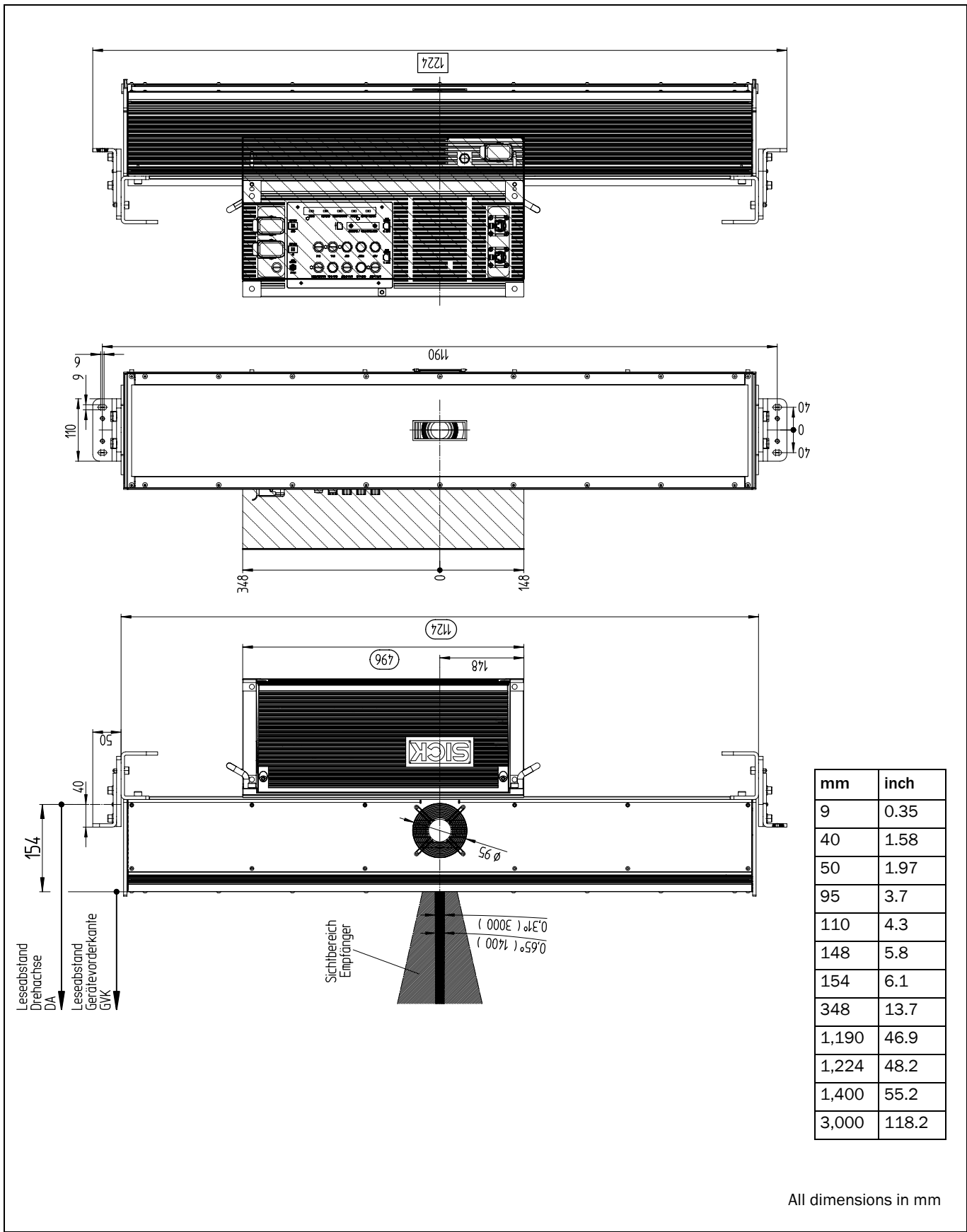


Abb. 9-4: Dimensions of the ICR890 System

ICR890

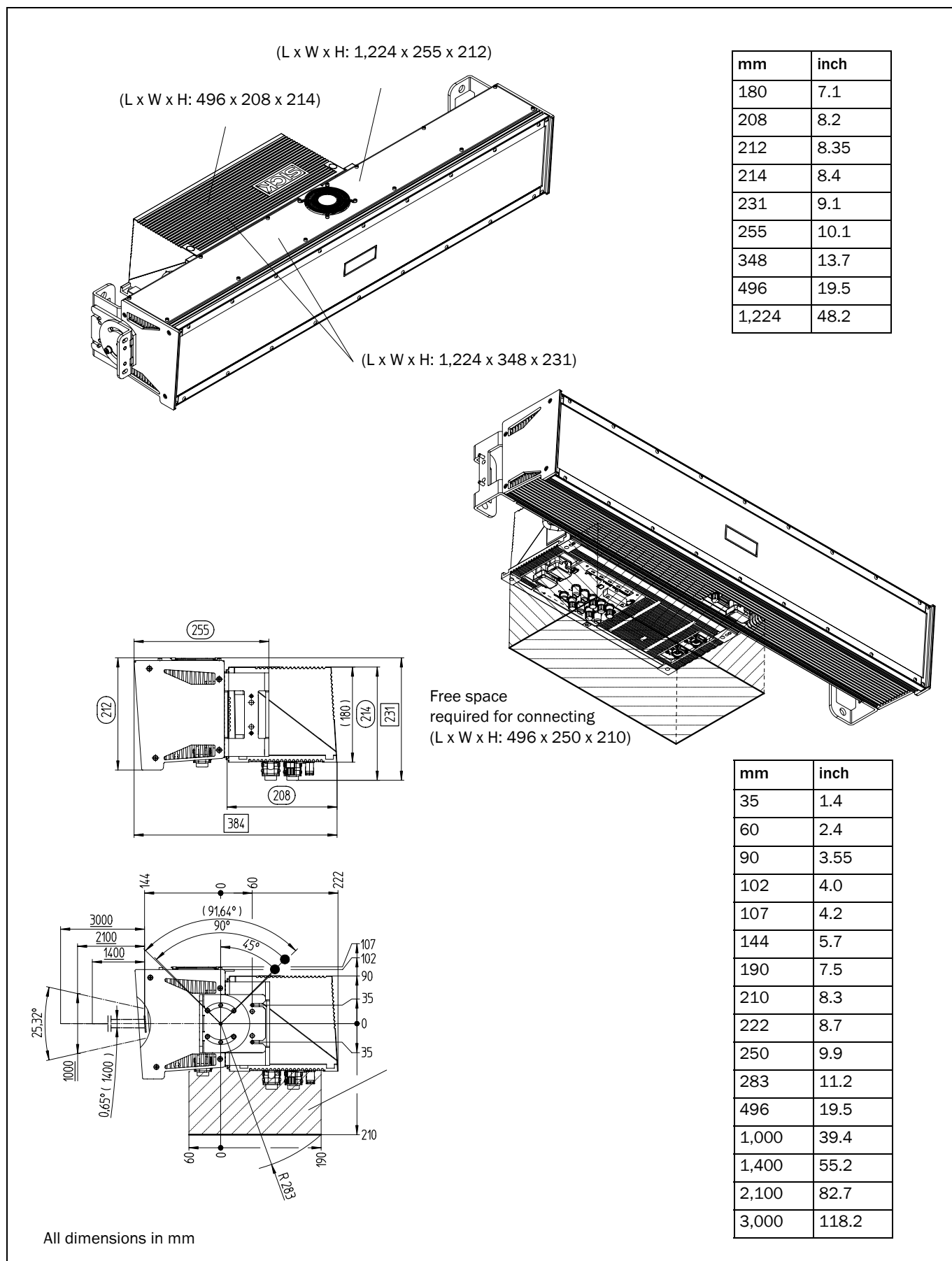
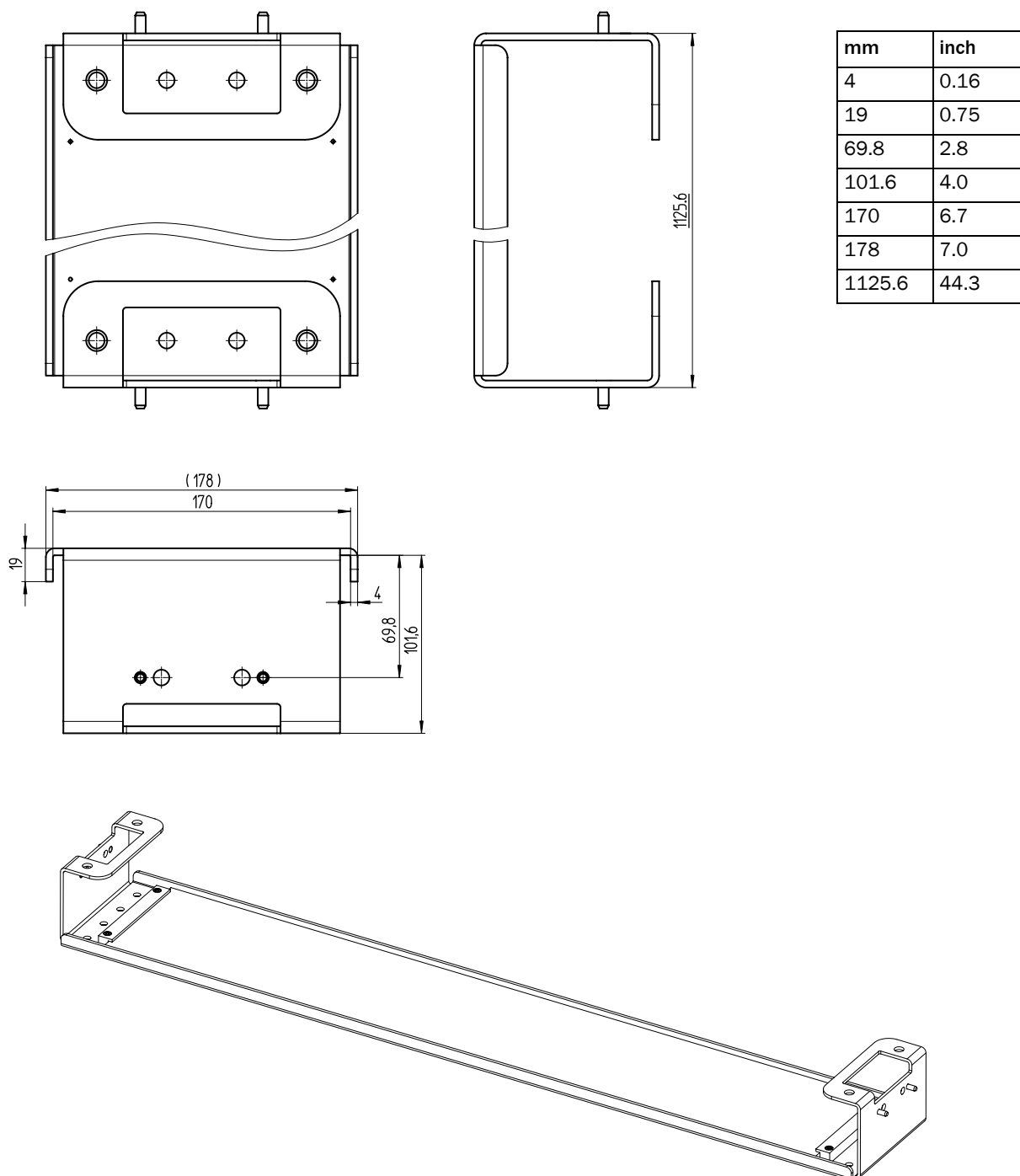


Abb. 9-5: Total dimensions of the ICR890 System and the free space required for connecting

9.6 Deflection mirror dimensional drawing



All dimensions in mm

Abb. 9-6: Dimensions of the deflection mirror

10 Appendix

10.1 Appendix overview

The appendix contains the following additional information:

- Configuring the ICR890 System with command strings
- Help table for calculating code length of a bar code
- Ordering information
- Supplementary documentation (overview)
- Glossary
- Image of EC Declaration of Conformity
- Decodeable 1-D codes/2-D codes

10.2 Configuring the ICR890 System with command strings

As an alternative to the SOPAS-ET Configuration Software, the ICR890 System can also be configured and operated with command strings via all the data interfaces. Each command string can be displayed via the SOPAS-ET Configuration Software.

- To request a command string in the SOPAS-ET Configuration Software, use the right mouse button to click on a parameter.

Note Both the command strings and the SOPAS-ET Configuration Software are based on command language which directly accesses the command interpreter of the ICR890 System. This command language must be used with care as the ICR890 System executes sent commands immediately. Parameter values altered via commands are at first only active in the current parameter set in the working memory (RAM) of the ICR890 System. To save in the permanent memory, the altered parameter set must be copied into the EEPROM using a special command, this ensures that the alterations are not lost when the power supply is switched off.

10.3 Calculating code length of a bar code

The code length of a bar code corresponds to the number of characters used in the print image, including the check digit (if available).

To scan (decode) a code, the code length must be input using the SOPAS-ET Configuration Software. Depending on the bar code type, the code length can, according to the relevant formula in [Tab. 10-1](#), be calculated by counting the bars and spaces.

Calculating the length of a bar code:

1. Determine the bar code type and count the bars or wide elements (bars and spaces), incl. start and stop characters according to the information in [Tab. 10-1](#).
2. Calculate the bar code length according to the relevant formula.
3. Enter the results via the SOPAS-ET Configuration Software, as shown in column 4 of the table.

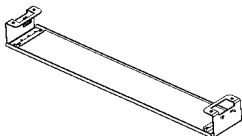
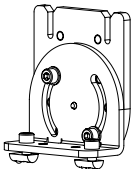
Bar code type	Count	Calculating the bar code length ¹⁾²⁾	Input in the SOPAS-ET Configuration Software
Code 39	Number of bars	$l_{\text{Code}} = \frac{\text{Number} - 10}{5}$	Calculated code length
2/5 Interleaved	Number of wide elements (bars and spaces)	$l_{\text{Code}} = \frac{\text{Number} - 1}{2}$	Calculated code length
EAN	n/a	13 characters (normal version) 8 characters (short version)	Activate 13-digit Activate 8-digit
UPC	n/a	12 characters (UPC A, normal version) 6 characters (UPC E, short version)	Activate version A Activate version E
Codabar	Number of bars	$l_{\text{Code}} = \frac{\text{Number} - 8}{4}$	Calculated code length
Code 128 (Character set A)	Number of bars	$l_{\text{Code}} = \frac{\text{Number} - 10}{3}$	Calculated code length
EAN 128	Number of bars	$l_{\text{Code}} = \frac{\text{Number} - 10}{3}$	Calculated code length
Pharmacode	Number of bars	Number	Number = code length
1) Check digit optional for code 39, 2/5 Interleaved, Codabar. Check digit is always integrated into the bar code print for EAN, UPC, code 128, code 93, EAN 128 according to the specification (automatically eliminated when the ICR890 System reading results are generated) 2) Apart from a few exceptions, every printed character represents an ASCII character which has to be decoded. Extended for code 39. The number of characters in the ICR890 System data string may be greater than the number of characters in the print image for code 93, code 128 and EAN 128, since they are made up of several character sets.			

Tab. 10-1: Help table for calculating code length of a bar code

ICR890

10.4 Ordering information

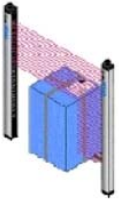
10.4.1 ICR890 High-end CCD Camera System

Order no.	Complete ICR890 System, consisting of:	Display
On request	1 x ICI890 Illumination and ICD890 Camera 1 x power supply cable for the illumination (no. 2039397) 1 x control line for the illumination (no. 6030216)	
	1 x deflection mirror (no. 2039600)	
	4 x 180° bracket (no. 2034457 for one bracket)	
	1 x WL18-3 Reading Pulse Sensor (photoelectric reflex switch) with connection cable and installation kit (no. 2034693)	
	1 x ICD890 Camera power supply cable (no. 2039398)	See Tab. 10-4, page 115
	1 x "ICR890 Manuals & Software" CD-ROM (no. 2039442)	

Tab. 10-2: Ordering information: ICR890 High-end CCD Camera System

Note For an exact type designation of the ICR890 System, see the type plate on the device.

10.4.2 Accessories: Controller and object distance detector

Order no.	Description	Display
1040386	MSC800-2300	
On request	MLG Modular Light Grid	
On request	VMS410/VMS510 Volume Measurement System	1 x 
On request	VMS410/VMS510 Volume Measurement System	2 x 

Tab. 10-3: In stock accessories: Controller and object distance detector

ICR890

10.4.3 Accessories: Cables and connectors

Order no.	Description	Wires	Length	Connection
6028420	Connection cable for Host/AUX (RS 232, RS 422/485), Ø 6.3 mm (0.25 in), screened, with 8-pole M12 socket and open end (wire end ferrules), IP 65, TPU/PUR bundle jacket	8 x 0.34 mm ² (22 AWG)	10 m (32.8 ft)	ICD890 Camera to Host or PC (open end)
6021164	CAN data cable, screened, twisted pair, with 5-pole M12 socket and 5-pole M12 connector, IP 65, PVC-free		1 m (3.28 ft)	ICD890 Camera to CAN bus
6021165	CAN data cable, screened, twisted pair, with 5-pole M12 socket and 5-pole M12 connector, IP 65, PVC-free		3 m (9.84 ft)	ICD890 Camera to CAN bus
6021168	CAN data cable, screened, twisted pair, with 5-pole M12 socket and 5-pole M12 connector, IP 65, PVC-free		5 m (16.4 ft)	ICD890 Camera to CAN bus
6021166	CAN data cable, Ø 6.8 mm (0.27 in), screened, twisted pair, with 5-pole M12 socket and open end (wire end ferrules), IP 65, PVC-free		5 m (16.4 ft)	ICD890 Camera to MSC800 (open end)
6021175	CAN data cable, Ø 6.8 mm (0.27 in), screened, twisted pair, with 5-pole M12 socket and open end (wire end ferrules), IP 65, PVC-free		10 m (32.8 ft)	ICD890 Camera to MSC800 (open end)
6021167	CAN terminal resistance, screened, with 5-pole M12 connector, IP 65	–	–	ICD890 Camera to CAN bus
6029776	Patch cable for GBit Ethernet connection, screened, twisted pair, with RJ-45 connector (IP 65) and RJ-45 connector (IP 20), CAT6, PVC-free		10 m (32.8 ft)	ICD890 Camera to GBit Ethernet
6029775	Crossover cable for GBit Ethernet connection, screened, twisted pair, with RJ-45 connector (IP 65) and RJ-45 connector (IP 20), CAT6, PVC-free		10 m (32.8 ft)	ICD890 Camera to GBit Ethernet
6030928	Patch cable for host connection, screened, twisted pair, with RJ-45 connector (IP 65) and RJ-45 connector (IP 20), CAT5		10 m (32.8 ft)	ICD890 Camera to Ethernet
6029630	Patch cable for host connection, screened, twisted pair, with RJ-45 connector (IP 65) and RJ-45 connector (IP 20), CAT5		3 m (9.84 ft)	ICD890 Camera to Ethernet
	Crossover cable for host connection, screened, twisted pair, with RJ-45 connector (IP 65) and M12 connector (IP 20), CAT5		10 m (32.8 ft)	ICD890 Camera to Ethernet
6024861	Connection cable for switching inputs IN 1/IN 2, Ø 5.7 mm (0.22 in), screened, with 5-pole M12 socket and open end, IP 65, PUR bundle jacket	5 x 0.25 mm ² (24 AWG)	5 m (16.4 ft)	ICD890 Camera to reading pulse sensor/incremental encoder (open end)
6027559	Connection cable for switching outputs OUT, Ø 5.2 mm (0.20 in), screened, with 4-pole M12 socket and open end, IP 65, PUR bundle jacket	4 x 0.34 mm ² (22 AWG)	10 m (32.8 ft)	ICD890 Camera to PLC (open end)
6030216	ICI890 Illumination control line, screened, twisted pair, with 8-pole M12 socket and 8-pole M12 connector, IP 65, PUR bundle jacket (halogen free)		0.6 m (23.6 in)	ICD890 Camera to ICI800
2039397	Power supply cable for ICI890 Illumination, with 8-pole Harting HanQ8 connector and 8-pole Harting HanQ8 socket, IP 65	7 x 4 mm ² (11 AWG)	0.75 m (29.6 in)	ICD890 Camera to ICI800
2039398	Power supply cable for ICD890 Camera, with 8-pole Harting HanQ8 socket and open end (wire end ferrules), IP 65	7 x 4 mm ² (11 AWG)	10 m (32.8 ft)	ICD890 Camera to power supply (open end)
2032922	Power supply cable for ICI890 Illumination, with 8-pole Harting HanQ8 connector and 8-pole Harting HanQ8 socket, IP 65, PVC-free	7 x 4 mm ² (11 AWG)	0.75 m (29.6 in)	ICD890 Camera to ICI800
2032926	Power supply cable for ICD890 Camera, with 8-pole Harting HanQ8 socket and open end (wire end ferrules), IP 65, PVC-free	7 x 4 mm ² (11 AWG)	10 m (32.8 ft)	ICD890 Camera to power supply (open end)

Tab. 10-4: In stock accessories: Cables and connectors

10.4.4 Accessories: Incremental encoder

Order no.	Description
2039455	Incremental encoder with friction wheel, resolution 10 mm (394 mil)/pulse, max. 100 kHz, operating voltage 10 to 30 V DC, operating temperature 0 to +60 °C (+32 to +140 °F). With fixing bracket and fixing material, 10 m (32.8 ft) connection cable with 5-pole M12 socket and open end. For operation with the ICR890 System and an MLG Light Grid.
2039457	Incremental encoder with friction wheel, resolution 0.2 mm (7.9 mil)/pulse, max. 100 kHz, operating voltage 10 to 30 V DC, operating temperature 0 to +60 °C (+32 to +140 °F). With fixing bracket and fixing material, 10 m (32.8 ft) connection cable with 5-pole M12 socket and open end. For operation with the ICR890 System and a VMS4xx/5xx.
2039456	Incremental encoder with friction wheel, resolution 1 mm (39.4 mil)/pulse, max. 100 kHz, operating voltage 10 to 30 V DC, operating temperature 0 to +60 °C (+32 to +140 °F). With fixing bracket and fixing material, 10 m (32.8 ft) connection cable with 5-pole M12 socket and open end. Application-dependent usage (not for operation with VMS4xx/5xx).

Tab. 10-5: In stock accessories: Incremental encoder

10.4.5 Accessories: Cleaning agents for front window of the illumination

Order no.	Description
4003353	SICK lens cloth (do not use for deflection mirror)
5600006	SICK synthetic cleaner (do not use for deflection mirror)

Tab. 10-6: In stock accessories: Cleaning agents for front window of the illumination

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10.5 Supplementary documentation

Order no.	Title	Language	Contents
8011539	Operating Instructions "Modular System Controller MSC800"	German	Description of installation, startup and configuration of the MSC800
8011540	Operating Instructions "Modular System Controller MSC800"	English	Description of installation, startup and configuration of the MSC800
8009403	Operating Instructions "Modular MLG Light Grid"	German/ English	Description of installation, startup and configuration of the MLG Light Grid
8010591 ¹⁾	Operating Instructions "VMS410/VMS510 Volume Measurement System"	German	Description of installation, startup and configuration of the VMS410/VMS510
8010592 ¹⁾	Operating Instructions "VMS410/VMS510 Volume Measurement System"	English	Description of installation, startup and configuration of the VMS410/VMS510
8010447 ²⁾	Operating Instructions "VMS420/VMS520 Volume Measurement System"	German	Description of installation, startup and configuration of the VMS420/VMS520
8010448 ²⁾	Operating Instructions "VMS420/VMS520 Volume Measurement System"	English	Description of installation, startup and configuration of the VMS420/VMS520
8010817 ³⁾	Installation Instructions "Connector caps for VMS4xx/VMS5xx Volume Measurement System"	German/ English	Description of installation and connection of the connector caps
8009992 ⁴⁾	Operating Instructions "CLV490 Bar Code Scanner"	German	Description of installation, startup and configuration of the CLV490
8009993 ⁴⁾	Operating Instructions "CLV490 Bar Code Scanner"	English	Description of installation, startup and configuration of the CLV490
1) "VMS410/VMS510 Manuals & Software" on CD-ROM (no. 2034044), enclosed with VMS410/VMS510 2) "VMS420/VMS520 Manuals & Software" on CD-ROM (no. 2038921), enclosed with VMS420/VMS520 3) see 1) and 2) 4) "Bar Code Scanners Manuals & Software" on CD-ROM (no. 2029112), enclosed with CLV490			

Tab. 10-7: Supplementary documentation for the ICR890 System

10.6 Glossary

Also see the SOPAS-ET Configuration Software online help for further terms.

1-D code (bar code, strip code)

Field of dark strips (bars) and light spaces (elements) arranged in parallel, which, by working to a certain rule (specification), can be represented on the medium (subsurface) by various print processes. A user-readable (alpha)numeric character is produced from each machine-readable, corresponding number and combination of strips and spaces. Since the entire coded information, framed by start and stop characters, is available as a whole in one dimension and is also mostly analyzed by line, these bar codes are referred to as linear codes. The various code types differ in their codeable character inventory, design (number of elements per character, number of characters, start/stop characters, check characters), their information density and in their print tolerances. The length of the code strips and spaces has no bearing on the information content. However, longer code strips and spaces can be more easily analyzed by the reading device.

2-D codes

In two dimensional codes the information is arranged more densely in a matrix with the help of dark and light cells (quadrates). The vertical and horizontal arrangement of the cells in relation to the reference points in the centre and on the edges, determines the data content which is defined by the specification. In the case of error correction during reading, the code is tagged with a redundancy by way of a mathematical process (e. g. for Data Matrix ECC200 via error correction code words). The unidirectional reading of 2-D codes is carried out by way of image processing.

Aperture angle α

Aperture within the boundaries of which the ICR890 System is able to analyze codes (through the lenses). A V-shaped area appears radially in front of the reading window, across the direction of transport (reading from above), in which the codes to be read must be positioned.

Aspect ratio

For bar codes with the code height (strip length) to code length (number of characters) ratio. Bar codes with very low ratios can be read using the SMART decoder.

Aux interface

Auxiliary data interface (RS 232) of the ICR890 System with fixed data output format. Access to the ICR890 System for operation and configuration is always possible via this interface, using the SOPAS-ET Configuration Software. Among other things, the interface controls the output of $\Rightarrow$ system and error messages and can be allocated various functions. Aux interface communication can also be executed via the Ethernet interface (port 2111).

CAN interface

Controls construction of a rapid SICK-specific CAN SENSOR network with various functions (e. g. multiplexer, master/slave) or integration into existing CAN networks after the CAN open protocol. Access to the ICR890 System for operation and configuration is possible via the CAN interface (network) using the SOPAS-ET Configuration Software in remote mode.

Capture area

Zone which the ICR890 System sets up around a moving code using the increment manager and the code position comparison. Allows, among other functions, the separation of codes with identical content, where the code type is the same.

Code geometry

Code length and height dimensions.

Code position (CP value)

Position of the first dark strip of a recognized bar code along the ⇒ red illumination line. Recorded by the ICR890 System in the mapped memory and used, e.g., for the separation of bar codes with identical data contents. For the ⇒ decoding process, the active analysis area within the illumination line can be restricted application-specifically by presetting the minimum and maximum CP values.

Command strings, commands

An alternative to the SOPAS-ET Configuration Software. User interface to the ICR890 System. A simple yet clearly structured command language for online modification of the parameter set in the ICR890 System. Directly accesses the command interpreter of the ICR890 System. Use of the host requires a corresponding programming task. The SOPAS-ET Configuration Software is based on the command strings.

Configuration file

SOPAS-ET Configuration Software file in which a complete ⇒ parameter set of the ICR890 System is stored for archiving. Can be printed out as a table.

Data forwarding

Possibility to transparently forward data sent from the host via the ICR890 System to a terminal using identifying information. The direction can also be reversed. The function also permits data received at one of the serial interfaces to be immediately sent, unaltered, via the same interface (echo).

Application: Forwarding reading results or reading pulse commands in pass through mode, e.g. for master/slave combination.

Data output string

Structured data telegram of the ⇒ reading result, generated on the ⇒ Host/CAN or Ethernet interface. The design is flexible and can be widely adapted to the subsequent data processing requirements. However, the data output format of the ⇒ Aux interface cannot be altered.

Decoder, decoding

From the code type-dependent analysis routine to reconstruction of the codes read in electronic form, in order to decipher the data content.

Download

Transfer process of the ⇒ parameter set, modified in ⇒ SOPAS-ET, from the PC to the ICR890 System. The SOPAS-ET Configuration Software always transfers the just modified parameter values in the background (“online“ communication mode) to the working memory (RAM) of the ICR890 System. Either the just processed parameters (DOWNLOAD CHANGED PARAMETER TO DEVICE) or all parameters on the indicated register tab (DOWNLOAD ALL PARAMETERS TO DEVICE) can be transferred using the right mouse button context menu. The previous parameter set in the ICR890 System is permanently written onto the EEPROM via the “permanent“ memory option.

Ethernet interface (Host)

Data interface with transfer rate (10/100 MBps).

The Ethernet interface can be used as an alternative to the Aux interface (port 2111) for configuration via TCP/IP using the SOPAS-ET Configuration Software or as an alternative to the host interface for generation of the reading result.

Error messages

Optical ⇒ messages in coded form (4-digit alphanumerical characters) with which the ICR890 System detects a diagnostic error during the reading operation. The output is executed via the Aux interface only. The error messages can be displayed by the user in the SOPAS-ET Configuration Software.

Focus position

Distance of the lens focal point in front of the reading window. The distance determines the DOF (depth of field) via the ICR890 System lenses, in which the code can be analyzed. The depth of field depends on the resolution.

Function interfaces

For the switching inputs and outputs of the ICR890 System.

GBit Ethernet interface

Allows rapid image transfer.

Good Read

The ICR890 System successfully recognized the code or the requested number of codes specified by the configured analysis conditions during the last ⇒ reading pulse.

Header

Data block in reading result of the ⇒ Host/CAN or Ethernet interface. Is the header in the ⇒ data output string for the subsequent code data content. Consists of reading diagnosis data and/or constants (control characters, letters, digits). In the default setting of the ICR890 System the “header“ block is empty.

Help input

Special function of the ⇒ Aux interface. Allows the additional manual input of code data for completion of the reading results sent to the host.

Host interface

Main data interface of the ICR890 System with configurable data output format. Allows, among other functions, the output of the $\Rightarrow$ reading result in telegram form to the host/PLC. Works as a gateway in conjunction with the SICK-specific CAN-SENSOR network. Available with either RS 232 or RS 422/485 version. Provides various transfer protocols. Access to the ICR890 System for operation and configuration is also possible via the host interface using the SOPAS-ET Configuration Software. Host interface communication can also be executed via the Ethernet interface or the CAN interface.

Master/Slave configuration

Special arrangement and technical circuit connection of maximum 8 ICR890 Systems to one reading station (e. g. multi-side reading) using the CAN interface. Via the master the combination acts on the host as just one device.

Multi-reading

Selectable number of readings which must each deliver internal results from one and the same bar code before the ICR890 System generates the reading result.

No read

The ICR890 System did not recognize any or the requested number of codes specified by the configured analysis conditions during the last $\Rightarrow$ reading pulse.

No read format

Special configurable data block as a replacement for each expected and unrecognised code in the data output string of the Host/CAN or Ethernet interface in case of a $\Rightarrow$ no read. Consists of the reading data with/without defined error string or is completely eliminated. In its default setting, the ICR890 System generates the reading data as no read format with the "NOREAD" error string.

Object distance

Gauge for focusing the camera. Determined, e. g., by means of an MLG Light Grid or VMS4xx/5xx Volume Measurement System on the conveyor system during reading from above.

Object height

See object distance.

Parameter set

Data set which is used to initialize and activate the implemented functions of the ICR890 System. Transferred using the $\Rightarrow$ upload or $\Rightarrow$ download from the ICR890 System to the SOPAS-ET Configuration Software or vice versa.

Reading area (DOF)

Depth of field on both sides of the lens focal point at the reading level. Size of the area depends on the resolution and the reading distance.

Reading diagnosis data

Data which the ICR890 System derives directly from the reading process. The data allows, among other things, an assessment of the reading quality.

Reading gate, reading interval

Time window in which the ICR890 System switches on the illumination and attempts to recognize valid codes from the read information. The reading gate can be shorter than the external reading pulse, depending on the output mode of the selected reading result.

Reading pulse

Triggering of the internal ⇒ reading gate via an ICR890 System external pulse is carried out by means of a photoelectric reflex switch or a command from the host via the serial interface.

Reading result

Electronic representation of the data contents of the code which has been read together with ⇒ reading diagnosis data in a ⇒ data output string after completion of the reading pulse.

Result status output

Functions of both switching outputs “OUT 1” and “OUT 2” during reading operation. Indicates each status of the reading result without displaying its contents (e.g. “good read”). One status per output can be provided with the SOPAS-ET Configuration Software. The “result” LED is coupled with the “Result 2” output.

Saving to the ICR890 System

The application-specific ⇒ parameter set can be stored on the ICR890 System either temporarily or permanently. In the case of temporary storage, the parameter set is only contained in the working memory (RAM) and is lost as soon as the power supply is switched off. In the case of permanent storage, the parameter set is also transferred to the EEPROM of the ICR890 System and saved as a current data set after switching off. The default setting is deposited in a Read Only Memory (ROM) irrespective of this.

Sending point

Output time of the reading result in relation to the start of the ⇒ reading pulse and the internal ⇒ reading gate.

SMART decoder

Specially developed ⇒ decoder for reading bar codes with extremely small code heights and or bad or soiled print images.

SOPAS-ET

PC configuration software, to run on Windows 98™, ME™, NT 4.0™, 2000™ and Windows XP™. Allows offline configuration (adaptation to local reading conditions) and online operation of the ICR890 System in dialogue. The ⇒ parameter set to be processed using the ICR890 System can be exchanged by means of ⇒ upload and ⇒ download.

SOPAS-ET Help

Online help which supports use of the SOPAS-ET Configuration Software. The parameter functions of the ICR890 System and the respective value range are explained in the online help. Runs using an HTML browser, such as “Internet Explorer™”, and can be called up in the SOPAS-ET Configuration Software.

Start/Stop operation

In this type of reading pulse, only one object per reading pulse is located in the reading area. External sensors, command strings or the free running of the ICR890 System control the beginning and end of the reading pulse for the ICR890 System (stand-alone device). In the case of combined use with other ICR890 Systems in a master/slave combination with the MSC800 (e. g. unidirectional double-side reading), the ICR890 System receives its pulse signals via the MSC800. The length of the reading area is determined in this case by the distance of both external sensors for the start (beginning of the reading area) and stop (end of the reading area) of the reading pulse. The minimum reading distance between two objects must always be greater than the length of the reading area. Networking the ICR890 System to the MCS800 is carried out via the CAN interface.

Terminator

Data block in the reading result of the ⇒ Host/CAN or Ethernet interface. Serves as completion of the preceding code data contents. Consists of reading diagnosis data and/or constants (control characters, letters, digits). The “terminator“ block is empty in the default setting of the ICR890 System.

Tracking operation

In this type of continuous reading pulse, several objects are simultaneously located in a row in the reading area. For unambiguous allocation of the read codes to the objects, a minimum gap must be maintained between two objects and band increment signals have to be available. The ICR890 System can be used with other ICR890 Systems using the MSC800 (e.g. unidirectional triple-side reading). The ICR890 System contains pulse signals and increment values via the MSC800. The length of the reading area is determined in this case by the distance of the external sensor for the beginning/end of the object at the beginning of the reading area and the object entry point (data output) in the direction of transport of the MSC800 at the end of the reading area. Networking the ICR890 System to the MCS800 is carried out via the CAN interface. The ICR890 System manages recorded objects by means of an internal object tracking list.

Upload

Transfer process of the ⇒ parameter set of the ICR890 System to the PC according to ⇒ SOPAS-ET. The SOPAS-ET Configuration Software loads a complete copy of the current parameter set from the working memory (RAM) of the ICR890 System (UPLOAD ALL PARAMETERS TO DEVICE). Parameter values must be represented in the register tabs before the current parameter set can be modified.

User interface

Windows-oriented input interfaces in the SOPAS-ET Configuration Software for operation and configuration of the ICR890 System.

10.7 EC Declaration of Conformity

[Fig. 10-1](#) and [Fig. 10-2](#) show a scaled down version of the EC Declaration of Conformity (page 1) for the ICD890 Camera and the ICI890 Illumination.

- The complete EC Declaration of Conformity can be requested from SICK AG.



EC Declaration of conformity

en

Ident-No. : 9097046

The undersigned, representing the following manufacturer

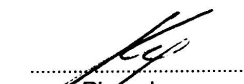
SICK AG
Nimburger Straße 11
79276 Reute
Germany

herewith declares that the product

ICD890

is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the standards and/or technical specifications referenced overleaf have been applied.

Reute, 2006-07-17


.....
ppa. Pierenkemper
(Manager Development
Division Auto Ident)

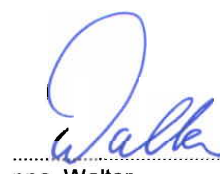

.....
ppa. Walter
(Manager Production
Division Auto Ident)

Abb. 10-1: EC Declaration of Conformity for the ICD890 Camera (page 1, scaled down version)

ICR890

**EC Declaration of conformity**

en

Ident-No. : 9099204

The undersigned, representing the following manufacturer

SICK AG
Nimburger Straße 11
79276 Reute
Germany

herewith declares that the product

ICI890

is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the standards and/or technical specifications referenced overleaf have been applied.

Reute, 2006-07-17



.....
ppa. Pierenkemper
(Manager Development
Division Auto Ident)



.....
ppa. Walter
(Manager Production
Division Auto Ident)

Abb. 10-2: EC Declaration of Conformity for the ICI890 Illumination (page 1, scaled down version)

Notes:

ICR890

10.8 Code samples (decodeable)

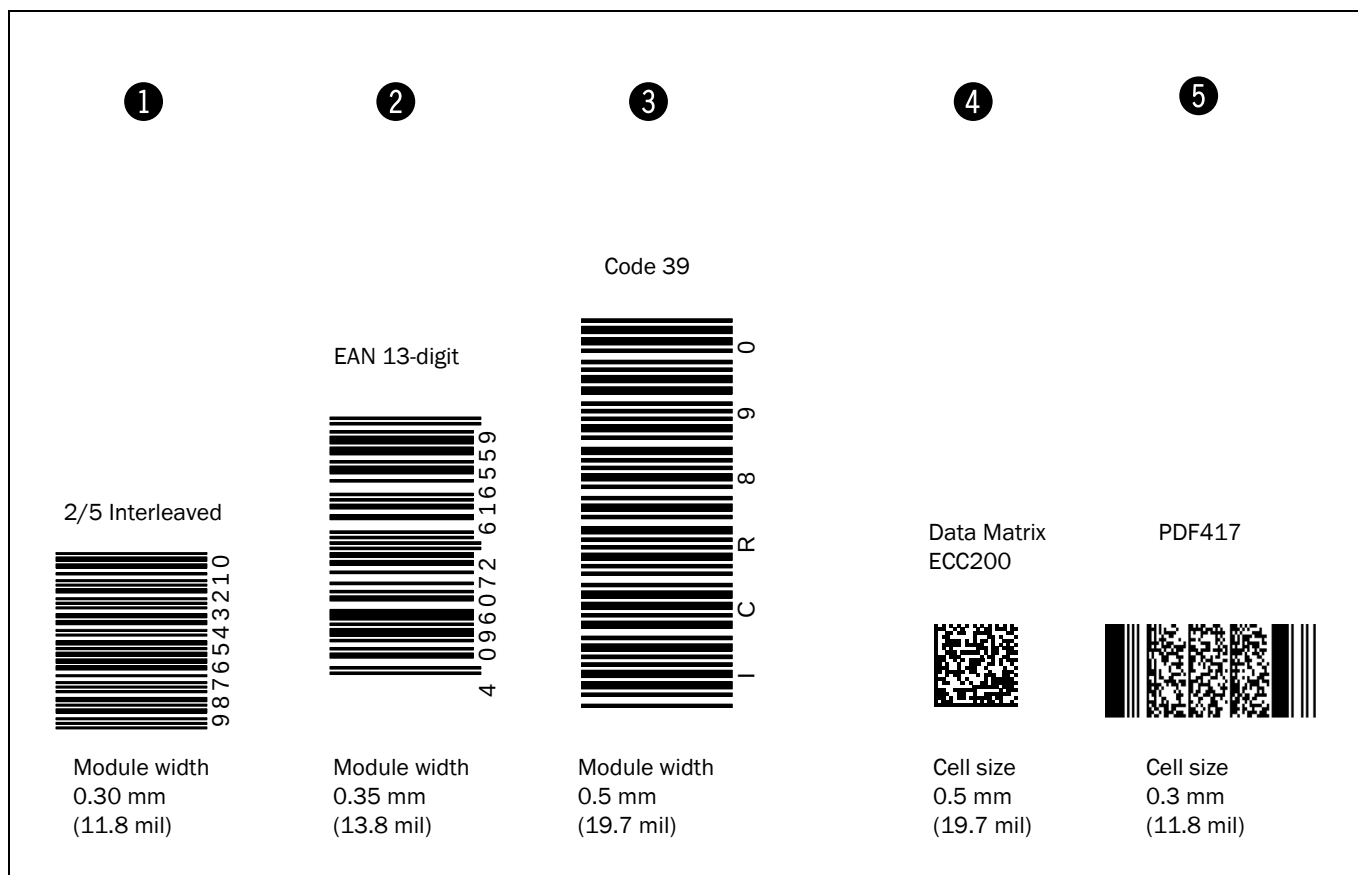


Abb. 10-3: Code samples of 1-D codes of various module widths (print ratio 2:1) and 2-D code of various cell sizes

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